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ABSTRACT

Presented is the National Science Foundation's fiscal year 1975 survey of expenditures for scientific activities at colleges and universities. The survey covered 562 institutions, includes funds expended for activities specifically organized to produce research outcomes, and includes direct and indirect costs. Statistical data presented includes: expenditures in science and engineering, source of funds, character of work, field of science, type of institution, geographic distribution, and federally funded research and development centers administered by universities. Total R&D expenditures in universities and colleges increased 12% to $3.4 billion in the 1974-75 period. In constant 1972 dollars, academic research and development increased 2% in 1975, following a decline of 5% in 1974. Federally sponsored funds accounted for two-thirds of academic expenditures in 1975. (SL)

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Expenditures for Scientific Activities at Universities and Colleges Fiscal Year 1975

SE 022 632

Surveys of Science Resources Series
National Science Foundation
NSF 77-307

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"Federal Agencies Allocated Over $4.5 Billion to Universities and Colleges in FY 1975"	76-327	——
"Self-Supported Graduate Science Students Increased by 22 Percent in 1975"	76-320	——
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FOREWORD

Recent trends in academic research expenditures, when expressed in constant dollar terms, have been marked by declining rates of growth due in part to reduced growth rates in funding received from the Federal Government and in part to inflationary economic conditions. At the same time, academic institutions have experienced a financial pinch resulting from rising costs affecting all areas of academic activity and the costs of long-term commitments to tenured faculty. Reduced levels of Federal academic research support is also reflected in the reduction in the number of graduate science students receiving Federal research assistantships since 1968. Federal budget proposals for fiscal years 1976 through 1978, however, have included provisions for substantial growth, even allowing for inflation in Federal R&D support to colleges and universities.

Constant vigilance is required to ensure the health of academic institutions. This requires information on their current status and changing conditions. This report is among those prepared by the National Science Foundation to evaluate the recent trends concerning the status of academic science. It is based on the fiscal year 1975 Survey of Scientific and Engineering Expenditures at Universities and Colleges conducted by the Foundation and represents the single source of detailed statistics on various characteristics of academic research expenditures.

The Foundation is appreciative of the cooperation of university and college officials in responding to the survey.

Charles E. Falk, Director
Division of Science Resources Studies
National Science Foundation

March 1977

general notes

- NSF's Survey of Scientific and Engineering Expenditures at Universities and Colleges for fiscal year 1975 covered 540 academic institutions and 22 university-administered Federally Funded Research and Development Centers (FFRDC's).
- R&D expenditure data presented in this report refer to *separately budgeted* R&D activities in the sciences and engineering. Research performed in the arts and humanities is excluded.
- Separately budgeted research and development includes all funds expended for activities specifically organized to produce research outcomes and commissioned by an agency either external to the institution or separately budgeted by an organizational unit within the institution.
- Departmental research (nonsponsored research) is "personal" or "faculty" research supported by general funds of the department as a specifically assigned, departmentally planned, or mutually understood part of the faculty member's total activity.
- Current expenditures analyzed in this report include all expenditures made by an institution during the reporting period (July 1 to June 30, or the institution's equivalent accounting period) from both the unrestricted and restricted current funds. Both direct and indirect costs are included. Direct costs are the salaries and wages of those working on a research project, funding for small equipment items, materials used, and other expenses directly related to the project. Indirect costs are those incurred by an institution in implementing and supporting the entire research project.
- The term "expenditures" differs from the Federal accounting term "obligations," which refers to funds awarded by a reporting agency during a particular fiscal year regardless of when these funds are spent by recipient institutions.
- Statistics shown in this report may not add to totals or subtotals because of rounding.
- Unless constant dollars are specified, data shown in this report are in terms of current dollars.
- In the absence of a reliable R&D cost index, the gross national product (GNP) implicit price deflator (based on 1972 prices) was used to convert R&D expenditures to constant dollars. The GNP deflator includes the effects of the price changes of all goods and services in the economy and thus can only approximate changes in costs of inputs directly related to R&D performance.
- Figures shown in this report represent universe totals for scientific and engineering disciplines. Approximately 98 percent of the academic institutions surveyed responded, including all of the 100 largest R&D performers. Estimates were made for nonrespondents, with an imputation rate of slightly more than 0.2 percent.

acknowledgments

This report was prepared in the Universities and Nonprofit Institutions Studies Group, Division of Science Resources Studies by James Hoehn with the assistance of Richard Bennof and Marge Machen. Richard M. Berry, Study Director, and Penny Foster, Associate Study Director, supervised the preparation of the report, and William L. Stewart, Head, R&D Economic Studies Section, provided special guidance.

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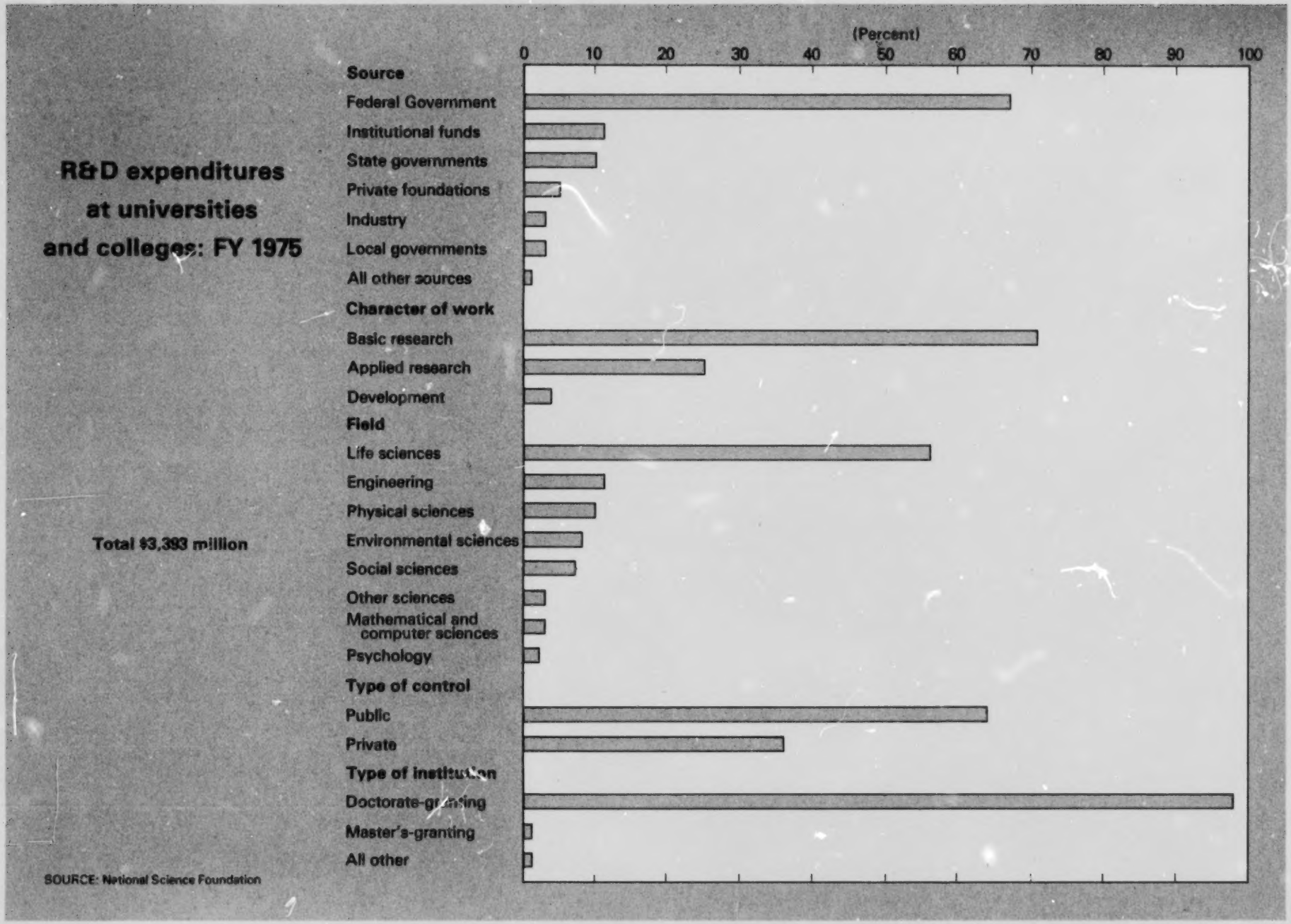
[1] See note on p. 23.


R&D expenditures at universities and colleges: FY 1975
Total $3,393 million
SOURCE: National Science Foundation
(Percent)
0
10
20
30
40
50
60
70
80
90
100
Source
Federal Government
Institutional funds
State governments
Private foundations
Industry
Local governments
All other sources
Character of work
Basic research
Applied research
Development
Field
Life sciences
Engineering
Physical sciences
Environmental sciences
Social sciences
Other sciences
Mathematical and computer sciences
Psychology
Type of control
Public
Private
Type of institution
Doctorate-granting
Master's-granting
All other

HIGHLIGHTS

- Total R&D expenditures in universities and colleges increased 12 percent to $3.4 billion in the 1974-75 period, twice the average annual growth rate shown during the previous 6 years. In constant 1972 dollars, academic research and development increased 2 percent in 1975, following a decline of 5 percent in 1974.
- Federally sponsored funds, which accounted for two-thirds of academic R&D expenditures in 1975, increased 12 percent from 1974 levels and totaled $2.3 billion. This exceeded the total growth in federally financed R&D funds in all economic sectors which increased 10 percent in 1975. The 18-percent increase in federally financed life sciences R&D programs reflected the release in 1974 of more than $150 million in impounded R&D funds to the National Institutes of Health, the largest factor in overall growth in academic R&D spending.
- Basic research spending increased 11 percent (1 percent in constant dollars) in the 1974-75 period, well over the 5-percent average annual growth rate that has occurred during the 1968-74 period. Basic research, which accounted for 70 percent of all academic R&D funding, totaled $2.3 billion in 1975. Spending for applied research and development increased 15 percent over 1974 levels, compared to a 10-percent annual rate between 1968 and 1974.
- All fields of science and engineering showed increases in R&D spending in 1975, ranging from a 17-percent increase in the life sciences to a 4-percent rise in the social sciences. The surge in the life sciences, which constituted over one-half of all science and engineering R&D funding in 1975, was the result of a tremendous growth in the biological and medical sciences—up 19 percent and 17 percent, respectively.
- Public universities and colleges reported a greater rate of growth in R&D expenditures than did private schools—14 percent as compared with 10 percent. Institutions under public control reported gains in R&D spending in all major fields of science, while private institutions reported declines in psychology and the social sciences. Since 1968, the share of academic research and development performed by private institutions has declined from 43 percent to 36 percent in 1975.
- As in 1974, the top 100 universities and colleges accounted for 83 percent of total research and development and comprised about 85 percent of Federal academic research spending. The share of total and Federal research and development performed by the top 20 institutions was 36 percent and 40 percent, respectively. These concentrations have remained nearly constant during the seventies.
- Captial expenditures for scientific and engineering activities in the academic sector totaled $1 billion in 1975, a 22-percent jump from 1974 and the first increase since 1969. Almost all of the increase occurred within the life sciences.
- R&D spending in the 22 university-administered Federally Funded Research and Development Centers (FFRDC's) totaled $987 million in 1975, an increase of 14 percent. The rise resulted primarily from a 30-percent jump in applied research spending, much of it in energy and weapons research. Applied research accounted for 35 percent of all FFRDC research and development in 1975, and for the first time, surpassed R&D outlays for both basic research and development.

INTRODUCTION

The data presented in this report are gathered from the National Science Foundation's eleventh Survey of Scientific and Engineering Expenditures at Universities and Colleges. The survey series originated in 1954 and since 1972 has been conducted on an annual basis. The fiscal year 1975 survey, following the pattern of recent years, collected information from three areas of academic spending for scientific activities: (1) Separately budgeted R&D expenditures; (2) expenditures for instruction and departmental research; and (3) capital expenditures for scientific activities.

This report examines the characteristics of separately budgeted R&D expenditures in a variety of ways: Source of funds; distribution among fields of science; and character of work (basic and applied research and development). Separate analyses are included on expenditures for instruction and departmental research, and capital expenditures for R&D endeavors. The R&D spending characteristics of university-administered FFRDC's are examined separately. Finally, the technical notes of this report, which traditionally have dealt with the scope and limitations of the survey, describe the findings of several recent studies on data quality and concepts.

All universities and colleges granting doctorate and master's degrees were surveyed, as well as all other academic institutions with over $50,000 in separately budgeted R&D expenditures. In addition, 22 university-administered FFRDC's were surveyed separately to determine their level of R&D performance.

The National Science Board, other academic planners, and officials of professional organizations have repeatedly sought out the information produced by this survey over the last 20 years. In the last year alone, two specific applications of these data given below illustrate its continuing importance. Both the American Council on Education and the RAND Corporation have conducted studies for the President's Biomedical Research Panel, based in part upon data from this finance survey, which were used to evaluate funding levels and policy guidelines in this field.[1]

[1] Lyle H. Lanier and Ivars Zageris. *A Study of Financial and Educational Trends in Research Universities in Relation to Federal Funding of Health-Related Research: 1964-1974.* (Washington D.C.: American Council on Education, March 1976) and, David E. Drew and John G. Wirt. *The Effects of Federal Funds upon Selected Health Related Disciplines.* (Santa Monica, Calif.: The Rand Corporation, March 1976).

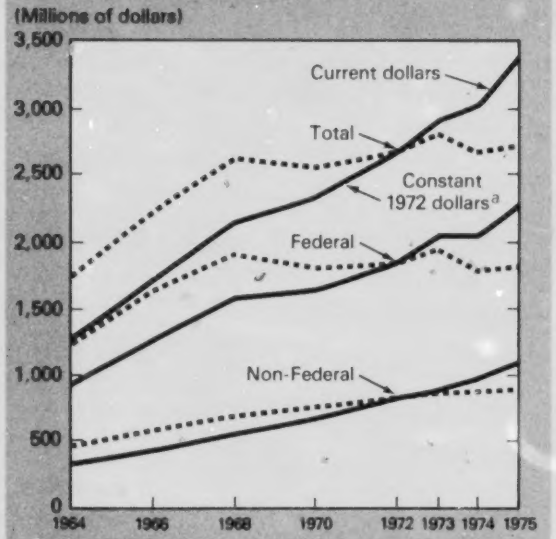
Part I
UNIVERSITIES AND COLLEGES

Section 1. CURRENT R&D EXPENDITURES IN THE SCIENCES AND ENGINEERING

Data in this section of the report pertain to current separately budgeted R&D expenditures. The term "current" denotes funds expended during the 1975 fiscal year. The survey questionnaire, reproduced in appendix C, fully defines separately budgeted R&D expenditures. Separately budgeted R&D funds do not include training grants, public service grants, etc.

Separately budgeted R&D expenditures in universities and colleges totaled $3.4 billion in 1975 and led all other economic sectors in R&D performance with a 12-percent increase over 1974 levels. This increase in academic R&D spending contrasted sharply with the 1973-74 increase of only 3 percent and is primarily due to the release of some previously impounded Federal funds. The 1974-75 growth rate of R&D expenditures in the academic sector also exceeded both the 3-percent increase in scientists and engineers employed in universities and colleges and the 8-percent increase in full-time graduate science and engineering (S/E) students in Ph.D.-granting institutions during the 1974-75 academic year.

R&D expenditures at universities and colleges: FY 1964-75



[a] Based on GNP implicit price deflator.
SOURCE: National Science Foundation

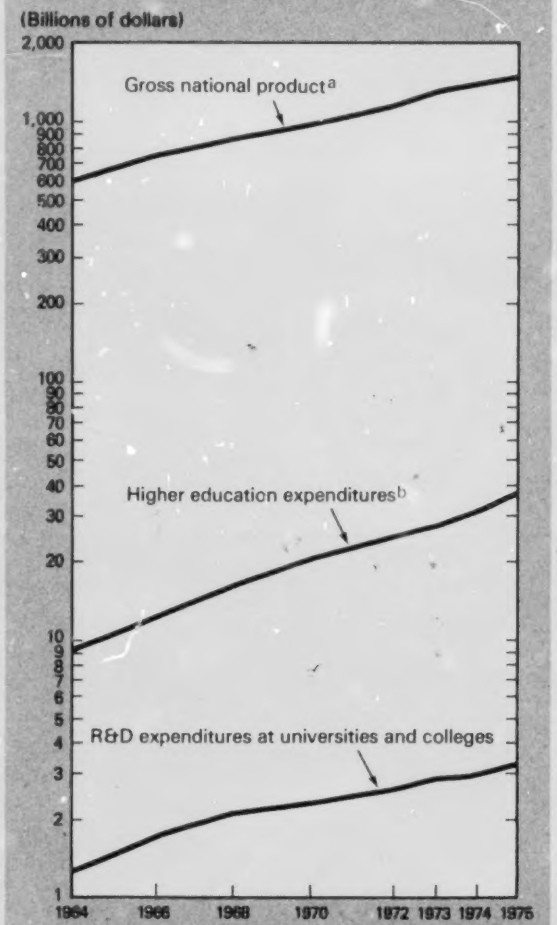
In constant 1972 dollars, academic R&D spending increased only 2 percent in 1975, following a 5-percent decline in the 1973-74 period. In order to compute the effect of inflation upon academic R&D spending, this report utilizes the GNP implicit price deflator adjusted to a 1972 fiscal year basis. (See technical notes for description of other academic price deflators.)

The growth rate of R&D expenditures since 1964 occurred in three general cycles. During the 4 years from 1964 to 1968, R&D expenditures at universities and colleges increased in current dollars at an average rate of 14 percent annually, while the rate of inflation averaged 3 percent per year. This growth rate of academic R&D spending slowed to 6 percent per year from 1968 to 1974, compared to an average rate of inflation of 5 percent per year. Finally, the rate of growth in R&D spending from 1974 to 1975, 12 percent, surpassed the effect of inflation by 2 percent.

When compared to R&D performance in other sectors of the economy, the academic sector fared well in 1975. The 12-percent growth in academic R&D spending exceeded that for Federal intramural research spending, (up 10 percent), industry, (up 8 percent), and other nonprofit institutions, (up 2 percent). Since 1964, the growth in academic R&D spending has outpaced both the expansion of the economy as measured by the GNP, and increases in total higher education expenses.[1]

[1] See footnote b on chart at right.

R&D expenditures at universities and colleges compared with other economic variables: FY 1964-75



[a] U.S. Department of Commerce, *Survey of Current Business, 1976*, (Vol. 56).
[b] Kenneth A Simon and Martin M. Frankel, *Projections of Education Statistics to 1984-85*. National Center for Education Statistics (NCES 76-210).
SOURCE: National Science Foundation

Source of Funds

Federal, State, and local governments together sponsored 78 percent of R&D activities at academic institutions in 1975. This does not represent a significant change from 1974 levels, although the share of support from Federal sources has been declining gradually since the midsixties. More importantly, the increases in funding from these three sources in the last 7 years have not kept pace with the rate of inflation. As a result, academic institutions have increasingly relied on other sources of support and their own institutional funds for the conduct of R&D programs.

In a study prepared for the President's Biomedical Research Panel, *The Effects of Federal Funds Upon Selected Health Related Disciplines*,[2] the point was made that consistent trends of Federal support were particularly crucial in the academic sector because of the nature of the highly specialized tenured faculty and because of the long-term financial commitments required by graduate programs. The Federal Government alone financed two-thirds, or $2.3 billion, of academic research and development in 1975, a reduction of 5 percentage points from the 72-percent share in 1964. The academic sector fared well when compared to the industrial sector. In that sector federally supported funds as a portion of total R&D financing declined from 57 percent in 1964 to 38 percent in 1975.[3]

Analysis of funding levels on a constant-dollar basis reveals that Federal support increased faster than the rate of inflation from 1964 to 1968 by an average of 11 percent per year. From 1968 to 1973 the average growth rate of Federal support barely kept ahead of the inflation rate, and it was during this period that public concern began to focus on the financial condition of universities. An impoundment of Federal funds in 1973 led to a 7-percent decline in Federal support in constant-dollar terms during the 1973-74 period, but the release of these funds in the next year caused the growth rate of Federal funding to exceed the inflation rate by 2 percent.

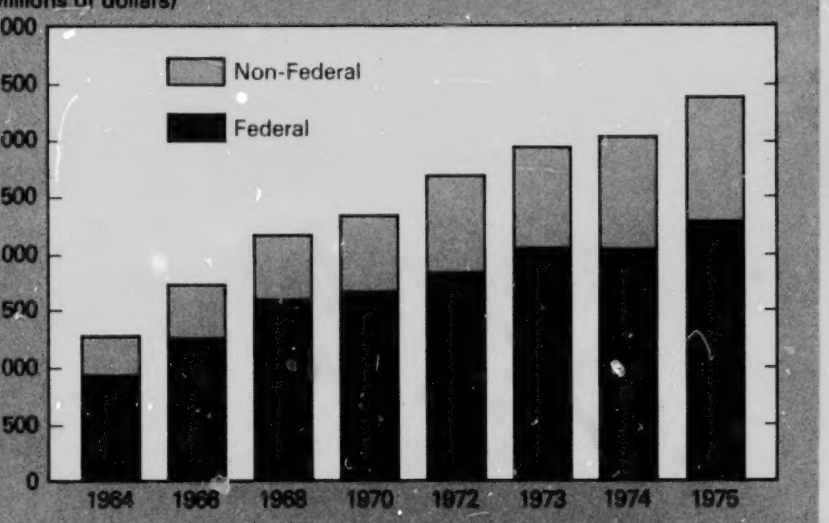
Both State and local governments increased their levels of support for academic R&D expenditures in 1975. State government funds totaled $336 million in 1975, up 8 percent over 1974. Local government sponsorship of R&D programs totaled $15 million, up 10 percent. Universities and colleges reported that increases in R&D funding from industry and private foundations, up 16 percent each, exceeded the rates of expansion from all governmental sources of R&D support.

In constant dollars, State and local government R&D spending expanded at an average annual rate of 1 percent from 1973 to 1975, following a 5-percent per

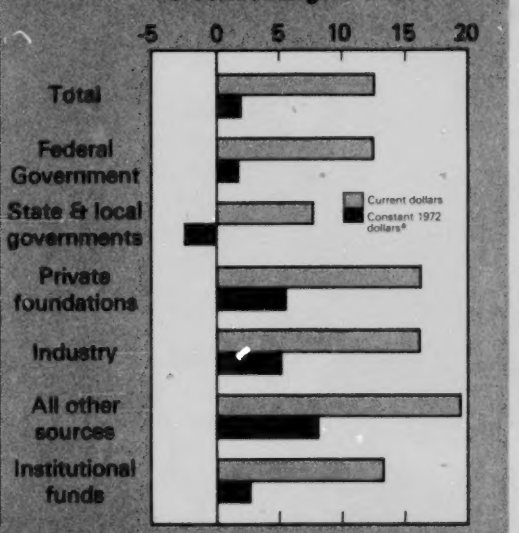
[2] David E. Drew and John G. Wirt, *op. cit.*

[3] National Science Foundation, *National Patterns of R&D Resources: Funds & Manpower in the United States, 1953-1976* (NSF 76-310) (Washington, D.C. 20402: Supt of Documents, U.S. Government Printing Office, 1976.)

R&D expenditures at universities and colleges by source: FY 1964-75



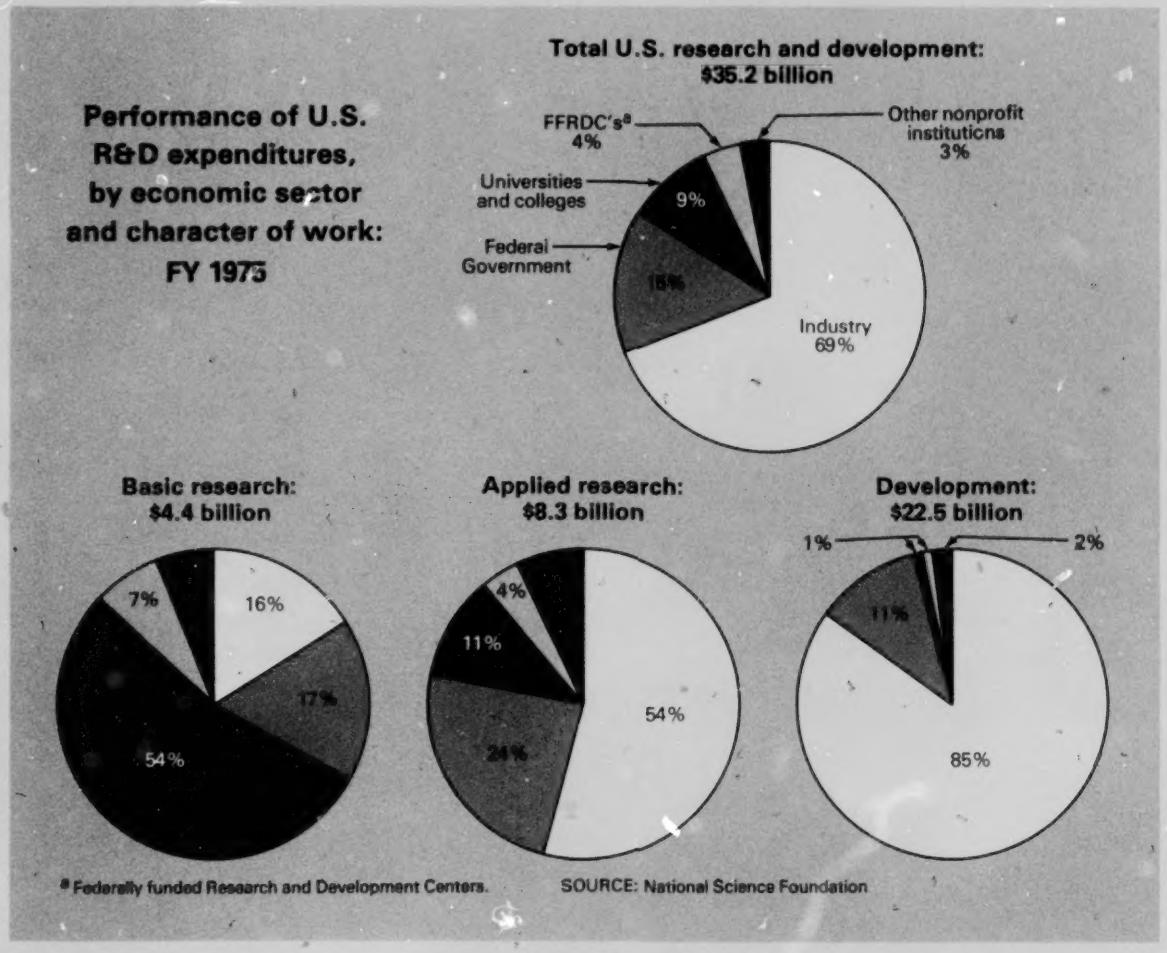
Millions of dollars			
Current		Constant	
1974	1975	1974	1975
3,017	3,393	2,679	2,728
2,032	2,284	1,805	1,836
327	351	290	282
142	166	126	133
96	112	85	90
76	90	67	73
344	390	306	314



* Based on GNP implicit price deflator.
SOURCE: National Science Foundation

year rate of growth over the previous 8 years. As the growth rate of Federal, State, and local government R&D funds slowed in the early seventies, the level of R&D support by industry, institutional funds, and other nonprofit institutions increased. These nongovernment sources of R&D support increased at an average rate of 12 percent per year from 1973 to 1975, following an average growth rate of 9 percent annually from 1970 to 1973. Concurrently, increasing numbers of full-time S/E graduate students relied on institutional support as well as their own resources for the acquisition of advanced degrees.[4]

[4] National Science Foundation, *Detailed Statistical Tables. Graduate Science Education: Student Support and Postdoctorals, Fall 1975* (NSF 75-322), 1976; and *Science Resources Studies Highlights*, "Self-Supported Graduate Science Students Increased by 22 Percent in 1975" (NSF 76-320), Sept. 30, 1976 (Washington, D.C. 20550).



Character of Work

The health of basic research in academic institutions has been of importance to U.S. science. The necessity for adequate and consistent funding in this area is best demonstrated by the fact that advanced technology has historically flowed from the new knowledge produced by fundamental research. Universities and colleges spend $2.4 billion for basic research in 1975. This amount represented, as in the preceding 7 years, over one-half of all basic research performed in the United States in 1975.[5] The level of basic research expenditures increased 12 percent in 1975 and represented 71 percent of all academic R&D activities, down slightly from a high of 79 percent in 1964.

Federal funds accounted for two-thirds of basic research conducted in all sectors of the economy and for 71 percent within the academic community. As the primary source of support for fundamental research at universities, Federal support has declined from a high of 77 percent in 1966. When converted to constant dollars, the limited growth trends in Federal support of fundamental research in the academic sector appear even more alarming. Following the 1964 to 1968 period when Federal basic research spending increased at an average annual rate of 11 percent, Federal support measured in constant dollars became erratic. The average rate of growth since 1968 has been less than 1 percent per year through 1975.

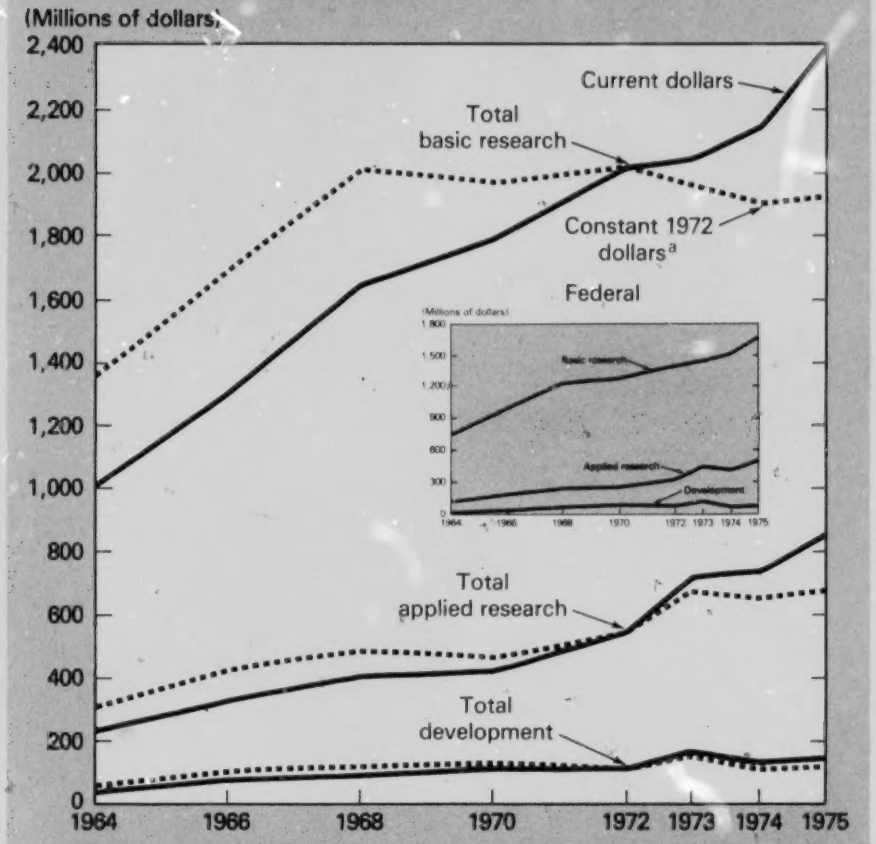
The effect of Federal support trends upon basic research is further complicated by reduced college enrollments. There is genuine concern that as these two factors lead to fewer academic jobs, the quality of research, which is dependent upon fresh and innovative ideas, will be seriously impaired.

[5] National Science Foundation, *National Patterns of R&D Resources: Funds & Manpower in the United States, 1953-1976* (NSF 76-310), *op. cit.*

In the 1964-70 period, applied research accounted for no more than 19 percent of academic R&D activities. During the last 5 years, however, universities and colleges increasingly attributed more of their R&D efforts to applied research. Since 1970, applied research, as a proportion of all R&D spending, has steadily increased to its 1975 level of 25 percent. Spending for applied research increased 15 percent in the 1974-75 period to $851 million. In current dollars, the average growth rate of applied research spending during the last 5 years was 15 percent per year. After allowing for inflationary effects, the reported growth of applied research in the academic sector has averaged 8 percent per year since 1970. Since 1964 federally financed funds have accounted for about three-fifths of academic applied research and in 1975 totaled $516 million.

Expenditures for development at universities and colleges totaled $148 million in 1975, or 11 percent above 1974 levels. Academic spending for development activities represented only 4 percent of all R&D expenditures, and during the last 12 years this proportion has remained fairly consistent. Two factors account for the relatively small amount of development being done in universities and colleges—the nature of Federal grants to the academic sector which are generally basic research oriented and the lack of resources required to pursue large development endeavors. Only 3 percent of Federal R&D funds goes for development programs at universities and colleges. Furthermore, the Federal Government financed only 52 percent of academic development in 1975, in contrast to the funding of 71 percent of basic research and 61 percent of applied research. Few universities and colleges reported development programs of any significant size and only one-fourth of the leading 100 institutions in this survey (ranked by total R&D spending) reported more than $1 million in development activities. Since 1970 the annual rate of growth in development funds has averaged 6 percent in current dollars and less than 1 percent in constant dollars.

R&D expenditures at universities and colleges by character of work: FY 1964-75

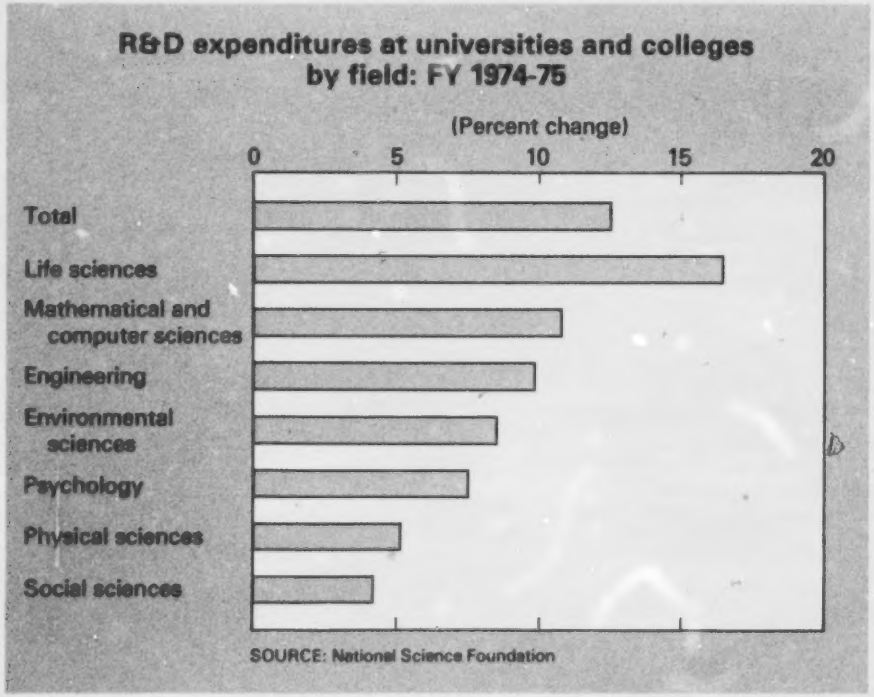


[a] Based on GNP implicit price deflator.
SOURCE: National Science Foundation

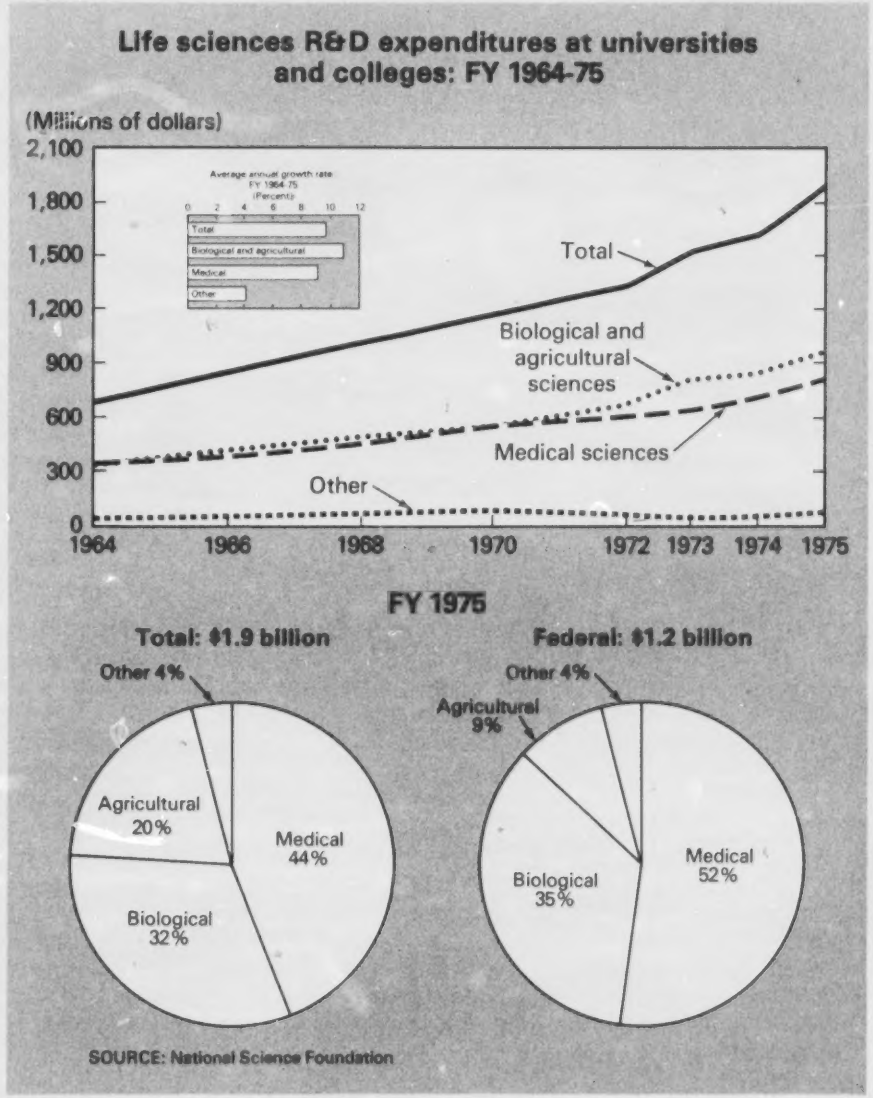
BROAD AREAS

Academic R&D expenditures increased in each of the seven major categories of science and engineering in 1975. The largest rise in percentage terms occurred in the life sciences, where R&D performance expanded 17 percent to $1.9 billion. Growth in medical and biological sciences R&D programs accounted for four-fifths of the life sciences increase.

Since 1964 the average annual growth rates in the seven fields of science and engineering have ranged from 4 percent per year in the physical sciences to 15 percent per year in the environmental sciences. Although federally financed R&D dollars have also increased since 1964, the federally sponsored share of total R&D spending has declined in six of the seven fields. Only in the social sciences has the Federal portion of R&D expenditures increased.



The life sciences comprised 56 percent of all academic R&D spending in 1975, and, as previously noted, the phenomenal increase in R&D spending in this area, 17 percent, can be traced to the release in 1974 of impounded Federal



funds. These funds, which totaled over $150 million, were primarily channeled into biomedical research projects sponsored by the National Institutes of Health. The impact of these funds was most dramatic in universities with medical schools. For example, R&D expenditures in the medical sciences at the University of California at San Francisco increased $10 million, or 28 percent above 1974.

Eighty-seven percent of the $1.2 billion in Federal life sciences support is concentrated in the biological and medical sciences, compared to 56 percent for non-Federal support. The increase in Federal funding occurred during the same year that a Presidential panel found the state of biomedical research to be sound despite fluctuations in Federal funding. In the agricultural sciences, the academic sector relies more heavily upon State funds and other non-Federal sources for R&D activities. Federal funds account for less than 30 percent of the support in the agricultural sciences. Taken as a whole, the life sciences relied upon Federal support for 65 percent of R&D spending in 1975, down slightly from 67 percent in 1964.

The University of Minnesota was the largest performer in the academic sector of life sciences research and development in 1975. Much of the $11 million increase in life science spending went to the schools of medicine and dentistry; in addition, the School of Agriculture reported expanded R&D activity. Another large performer in this field was Rockefeller University, which ranked first in R&D spending in the biological sciences. This institution emphasized biochemistry, immunology, and genetic research projects.

While no other area of science or engineering equaled the 17-percent growth rate in the life sciences, each of the other areas experienced substantial increases in R&D funding.

ENGINEERING

R&D expenditures for engineering in universities and colleges totaled $381 million in 1975, up 10 percent. The increase in federally financed R&D funds in engineering, up 8 percent, lagged slightly behind the overall increase in this field. The federally supported share of R&D spending in engineering declined from 79 percent in 1964 to 68 percent in 1975.

Massachusetts Institute of Technology (MIT) was the largest academic performer of engineering research and development in 1975. A variety of programs accounted for the engineering R&D expenditures at MIT in 1975, $31 million, which was more than twice the level at any other university. In 1973 MIT accounted for nearly one-fifth of engineering R&D spending when data from the Draper Laboratory was last included in this survey.

The University of Michigan ranked second and reported that over $10 million of the $13 million expended in engineering was utilized for the Highway Safety Research Institute in 1975.

The 10 institutions leading in life sciences R&D expenditures: FY 1974-75

[Dollars in thousands]

Institution	Total			Federal		
	1974	1975	Percent change	1974	1975	Percent change
Total	$1,626,020	$1,895,008	16.5	$1,051,617	$1,237,497	17.7
University of Minnesota	39,548	50,752	28.3	22,463	30,066	33.8
Johns Hopkins University	39,470	45,038	14.1	32,375	37,959	17.2
University of Wisconsin-Madison	37,943	44,892	18.3	21,203	23,806	12.3
University of Washington	37,594	43,620	16.0	32,257	36,784	14.0
University of California San Francisco	33,696	43,261	28.4	27,979	36,450	30.3
University of Chicago	35,817	42,075	17.5	25,086	30,573	21.9
Cornell University	36,345	39,712	9.3	16,609	18,602	12.0
Harvard University	34,166	39,652	16.1	28,908	32,159	11.2
Columbia University Main Division	30,375	38,243	25.9	23,005	26,818	16.6
University of California Los Angeles	28,453	35,097	23.4	23,826	28,806	20.9

SOURCE: National Science Foundation

The 10 institutions leading in engineering R&D expenditures: FY 1974-75

[Dollars in thousands]

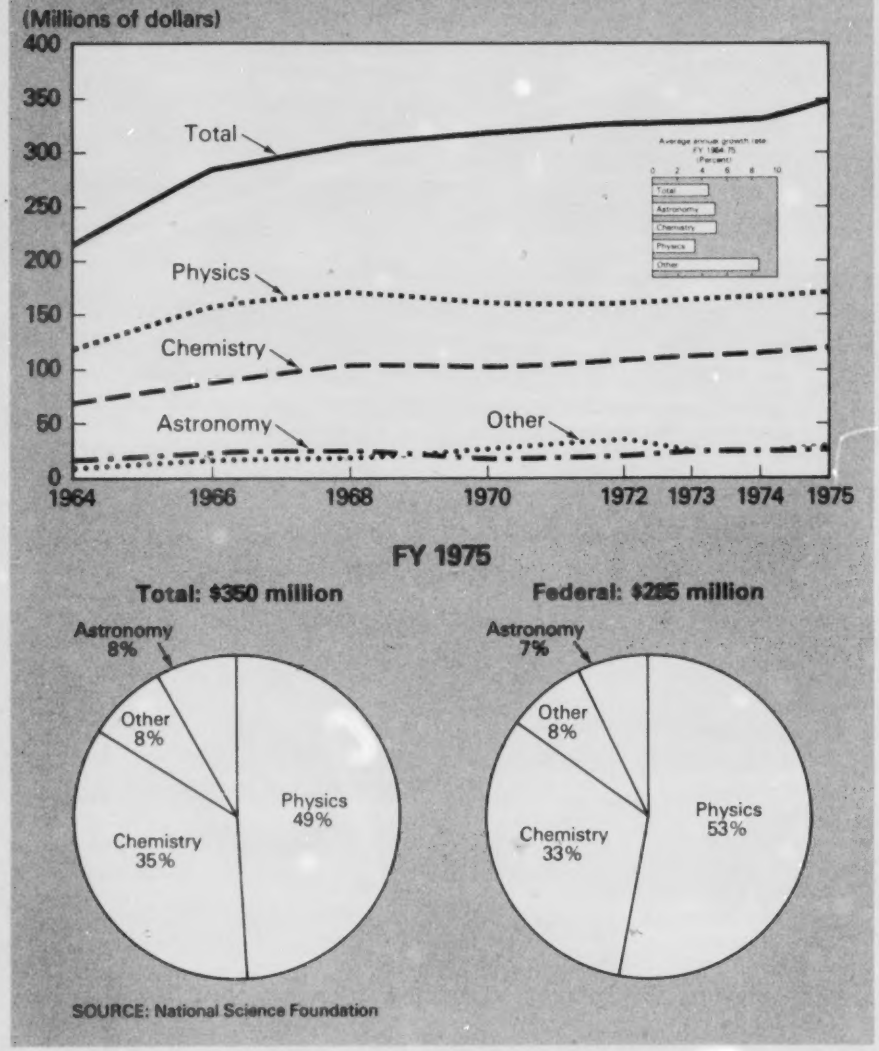
Institution	Total			Federal		
	1974	1975	Percent change	1974	1975	Percent change
Total	$346,217	$380,522	9.9	$239,521	$259,524	8.4
Massachusetts Intitute of Technology	26,032	31,002	19.1	20,722	24,190	16.7
University of Michigan	13,602	12,766	-6.1	8,476	7,765	-8.4
Stanford University	9,502	12,044	26.8	9,017	10,840	20.2
University of Illinois-Urbana	13,067	11,669	-10.7	10,416	8,492	-18.5
University of California Berkeley	10,546	11,448	8.6	7,838	8,365	6.7
Georgia Institute of Technology	8,574	10,334	20.5	4,186	5,547	32.5
Purdue University-all Campuses	8,002	9,501	18.7	5,592	6,375	14.0
Texas A&M University	10,852	9,084	-16.3	5,006	3,622	-27.6
Ohio State University	6,812	7,717	13.3	3,899	4,526	16.1
University of Southern California	6,313	6,899	9.3	5,981	6,479	8.3

SOURCE: National Science Foundation

R&D expenditures in the physical sciences, up 5 percent, totaled $350 million in 1975. No other field of science was as heavily financed with Federal funds. Since 1966, however, the portion of physical science R&D spending sponsored by the Federal Government has steadily declined from 86 percent to 81 percent. Over one-half ($150 million) of federally sponsored R&D funds in this field were concentrated in physics.

The largest academic performer of physical science R&D activities was Massachusetts Institute of Technology, which reported $23 million in 1975, nearly double the amount reported by second ranked University of California at Berkeley, $12 million. The R&D activities at the National Magnet Laboratory are among MIT's larger research endeavors. High-energy physics, nuclear chemistry, and space-related R&D programs accounted for much of the physical science activity at the University of California at Berkeley.

Physical sciences R&D expenditures at universities and colleges: FY 1964-75



SOURCE: National Science Foundation

The 10 institutions leading in physical sciences R&D expenditures: FY 1974-75

[Dollars in thousands]

Institution	Total			Federal		
	1974	1975	Percent change	1974	1975	Percent change
Total	$333,359	$350,340	5.1	$269,783	$384,664	5.5
Massachusetts Institute of Technology	20,671	22,572	9.2	17,779	19,712	10.9
University of California Berkeley	9,934	11,777	18.6	8,984	10,942	21.8
Stanford University	9,671	10,641	10.0	9,345	10,130	8.4
University of Wisconsin-Madison	9,593	10,345	7.8	5,615	5,799	3.3
University of California San Diego	9,682	9,929	2.6	9,457	9,641	1.9
Cornell University	9,756	9,892	1.4	9,071	9,112	.5
University of Chicago	9,007	9,228	2.5	8,439	8,681	2.9
Harvard University	8,886	9,127	2.7	8,489	8,317	-2.0
California Institute of Technology	7,908	9,108	15.2	7,400	8,204	10.9
University of Colorado	8,163	8,725	6.9	6,392	7,591	18.8

SOURCE: National Science Foundation

ENVIRONMENTAL SCIENCES

R&D spending in the environmental sciences totaled $255 million in 1975—up 9 percent. While federally sponsored funds in this field have quadrupled since 1964 from $45 million to $181 million, the portion of environmental research sponsored by the Federal Government has declined from 82 percent to 71 percent.

The University of California at San Diego was the leading R&D performer in the environmental sciences in 1975, with an estimated $41 million. This university also ranked first in Federal support in this field—$36 million. The Scripps Institute of Oceanography and the Institute of Marine Resources, both located at the University of California at San Diego, performed much of the environmental R&D activities.

The 10 institutions leading in environmental sciences R&D expenditures: FY 1974-75

[Dollars in thousands]

Institution	Total			Federal		
	1974	1975	Percent change	1974	1975	Percent change
Total	$234,989	$255,033	8.5	$168,298	$180,566	7.3
University of California San Diego	37,559	40,966	9.1	33,410	35,762	7.0
Woods Hole Oceanographic Institute	11,976	14,280	19.2	10,549	12,214	15.8
University of Alaska	9,645	10,525	9.1	5,508	6,758	22.7
Columbia University Main Division	8,980	10,428	16.1	8,745	10,235	17.0
University of Wisconsin-Madison	10,405	9,901	-4.8	5,186	4,635	-10.6
University of Hawaii	5,518	6,486	17.5	3,706	4,627	24.9
University of Miami	4,734	5,963	26.0	3,219	4,415	37.2
University of Michigan	3,165	5,677	79.4	1,768	4,012	126.9
Massachusetts Institute of Technology	4,691	5,246	11.8	4,431	4,944	11.6
Oregon State University	5,377	5,162	-4.0	4,826	4,546	-5.8

SOURCE: National Science Foundation

MATHEMATICAL AND COMPUTER SCIENCES

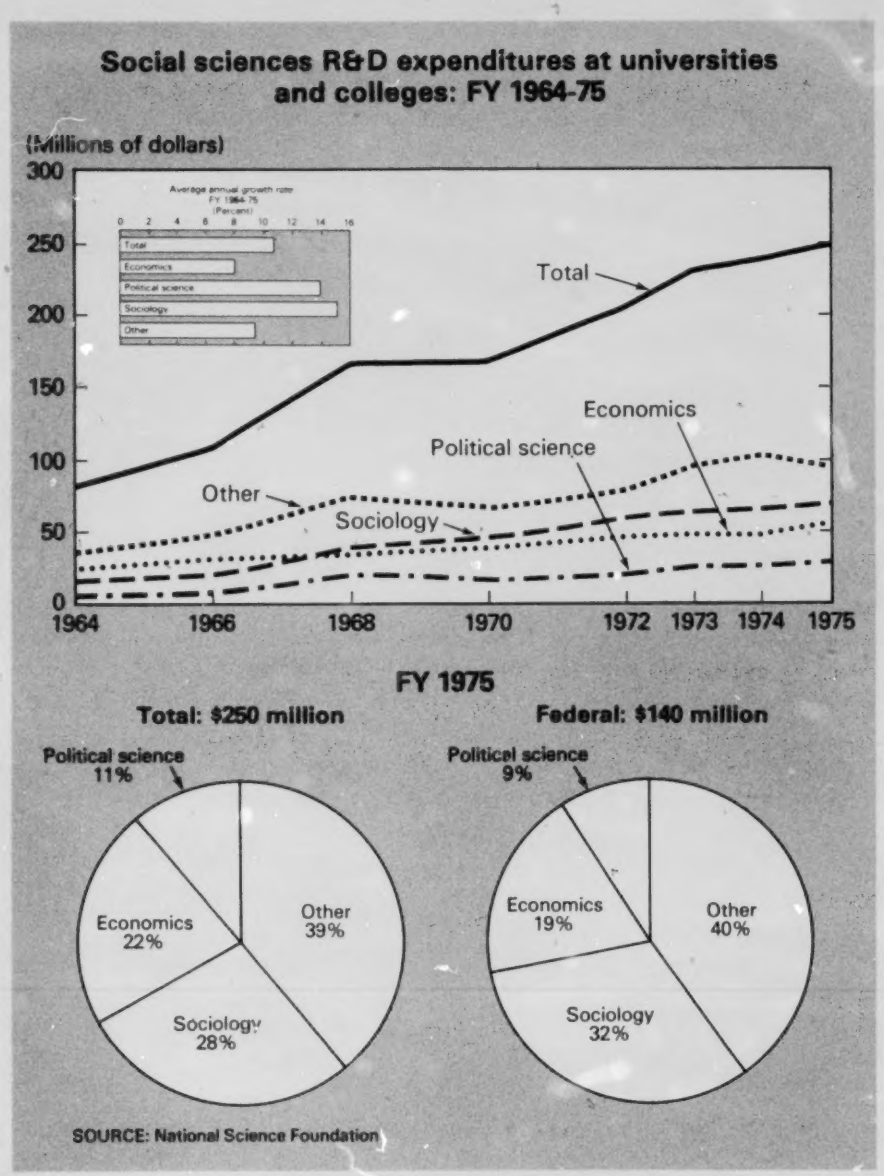
Expenditures in the mathematical and computer sciences totaled $85 million, increasing 11 percent in the 1974-75 period. The bulk of this R&D growth occurred in the computer sciences. In 1975 Federal funds totaled $65 million, or three-fourths of the R&D activity in the mathematical and computer sciences, in contrast with the 1964 level of Federal support to this field, 86 percent.

MIT led all R&D performers in mathematical and computer sciences expenditures with $7 million. Most of the $7 million that top-ranked MIT spent in this field was concentrated on computer science projects.

PSYCHOLOGY

R&D expenditures in psychology increased 7 percent in 1975 and totaled $80 million, of which $61 million was federally financed. Since 1964 the share of Federal support in this field has declined from 86 percent to 77 percent of total R&D spending.

The University of Michigan, the University of South Alabama, and Rutgers State University each reported increases of more than $1 million in psychology.



R&D expenditures in the social sciences increased 4 percent in 1975 and totaled $250 million. Federal support in this area amounted to $140 million, or 56 percent of all social sciences R&D spending. This is the only field of science where the Federal share of total R&D performance has increased since 1964.

The University of Michigan ranked first with $14 million in social science R&D expenditures which were concentrated in the Institute of Social Research. The University of Wisconsin at Madison ranked second with $13 million and reported $2 million in R&D expenditures at the Institute of Research on Poverty.

The 10 institutions leading in social sciences R&D expenditures: FY 1974-75

[Dollars in thousands]

Institution	Total			Federal		
	1974	1975	Percent change	1974	1975	Percent change
Total	$239,950	$249,929	4.2	$136,172	$139,785	2.7
University of Michigan	11,815	14,189	20.0	6,378	7,544	18.3
University of Wisconsin-Madison	12,788	12,756	- .3	8,251	6,552	-20.6
Harvard University	7,820	7,490	-4.2	3,870	3,572	-7.7
University of California Berkeley	7,010	7,281	3.9	3,938	3,157	-19.8
Michigan State University	5,335	6,473	21.3	3,508	3,802	8.4
Florida State University	3,043	5,339	75.5	1,779	3,374	89.7
Stanford University	5,331	5,301	- .6	4,833	4,542	-6.0
Pennsylvania State University	4,623	5,289	14.4	1,334	1,932	44.8
University of Illinois-Urbana	4,489	5,085	13.3	1,602	1,675	4.6
University of Minnesota	6,111	4,827	-21.0	2,654	2,639	- .6

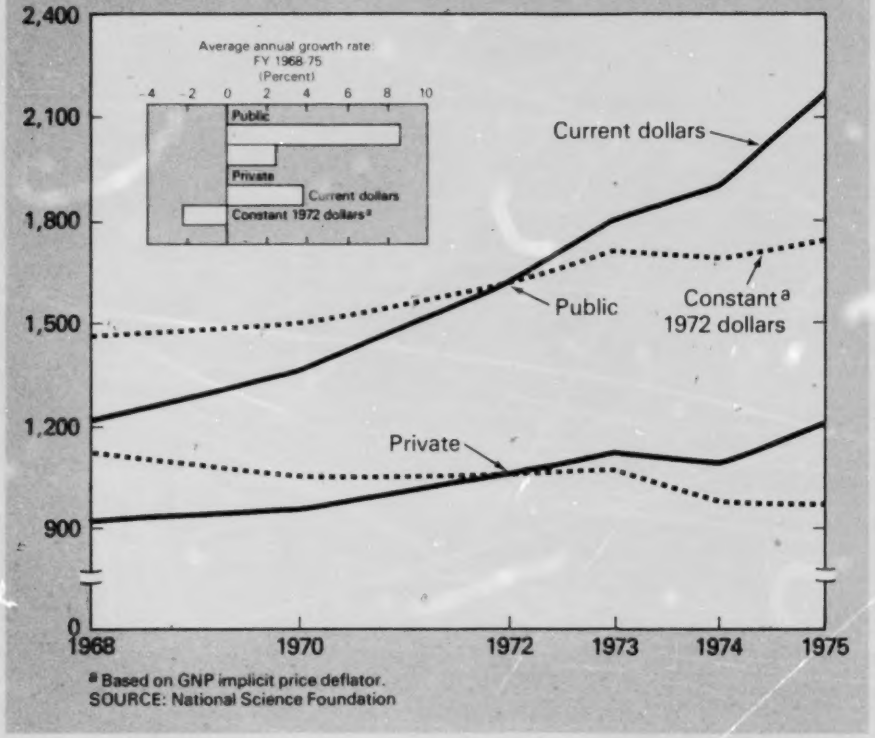
SOURCE: National Science Foundation

Institutional Control

R&D funding in 1975 at publicly controlled institutions increased 14 percent to $2.2 billion, following a 6-percent increase in 1974. Research spending at privately controlled institutions increased by 10 percent in 1975, following a decline of 3 percent in 1974.

The nature of R&D programs differed between public and private academic institutions, with basic research receiving more emphasis in the latter sector. In public schools, 64 percent of R&D expenditures went for basic research, 30 percent for applied research, and 6 percent for development. In private institutions basic research accounted for 82 percent of all R&D spending, while applied research accounted for 16 percent and development, 2 percent.

R&D expenditures at universities and colleges by institutional control: FY 1968-75



[a] Based on GNP implicit price deflator.
SOURCE: National Science Foundation

In the 1974-75 period funding for basic research increased by 13 percent within the public sector and by 10 percent at private institutions. Applied research spending increased by 16 percent in the public sector and by 14 percent within privately controlled institutions, while spending for development decreased by 13 percent at private institutions in contrast to an 18-percent increase in the public sector.

Life sciences expenditures, which accounted for 55 percent of all research at public institution in 1975, increased 18 percent, as well as other fields of science and engineering. In private universities and colleges, however, R&D spending grew in all fields except the social sciences and psychology. The life sciences, constituting 57 percent of all research at private institutions, showed a 14-percent increase in research funding over 1974 levels.

Since 1968 research spending has increased twice as fast at public universities and colleges than at private institutions.[6] The average annual growth rate in public institutions from 1968 to 1975 was 9 percent, while at private institutions the average rate was 4 percent per year. As a result, private institutions accounted for 36 percent of all research spending in 1975, compared to 43 percent in 1968.

In 1975 the growth of federally financed R&D expenditures in both the public and private academic sectors occurred at the same rates as did total R&D expenditures—14 percent and 10 percent, respectively. In terms of sources of

[6] Separate data on public and private institutions were not available from the survey prior to 1968.

R&D expenditures at universities and colleges by institutional control: FY 1968-75

[Dollars in thousands]

Fiscal year	Public			Private		
	Total	Federal	Percent federally financed	Total	Federal	Percent federally financed
1968	$1,217,519	$803,548	66.0	$931,189	$768,516	82.5
1970	1,367,812	869,049	63.5	967,047	778,451	80.5
1972	1,622,897	1,024,078	63.1	1,053,614	814,855	77.3
1973	1,804,718	1,140,653	63.2	1,134,885	897,555	79.1
1974	1,912,444	1,174,022	61.4	1,104,792	858,461	77.7
1975	2,180,005	1,340,781	61.5	1,213,131	943,198	77.7

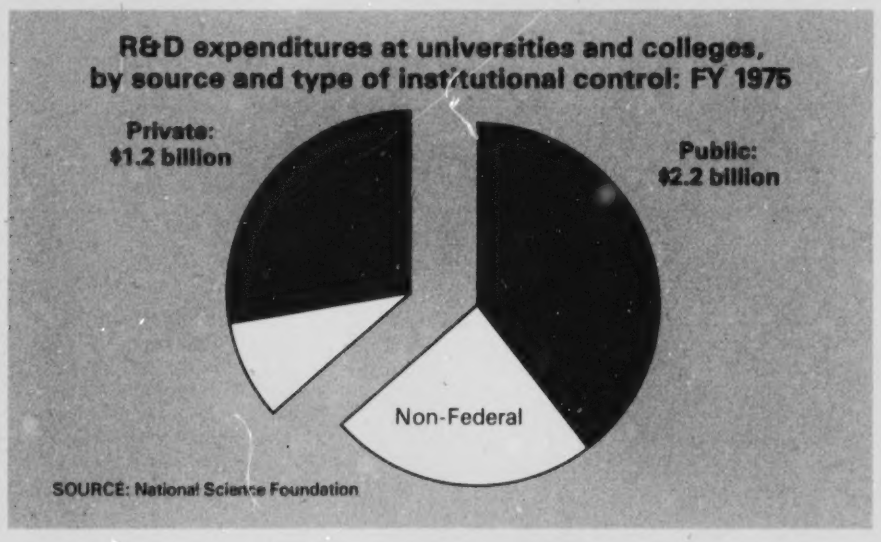
SOURCE: National Science Foundation

support, Federal funds constituted 62 percent of all research performed in publicly controlled institutions and 78 percent of all research and development in those under private control. The share of Federal funds has declined since 1968, when federally supported research accounted for 66 percent of all R&D performance within public institutions and 83 percent within the private sector.

Although federally sponsored expenditures were more heavily concentrated in public universities and colleges, than in private institutions, 59 percent and 41 percent, respectively, the distribution of Federal R&D funds appeared to benefit the private sector when compared to some other indices. For example, public schools received 76 percent of the funds from non-Federal sources. In addition, public universities accounted for over 70 percent of the full-time scientists and engineers employed in the academic sector and for 73 percent of full-time graduate students during the 1974-75 academic year.[7] Finally, non-R&D obligations by Federal agencies in 1974, which were expended in 1975, were more highly concentrated in public schools (63 percent) than were federally financed R&D expenditures.[8]

[7] National Science Foundation, *Detailed Statistical Tables. Graduate Science Education: Student Support and Postdoctorals, Fall 1975* (NSF 75-322), *op. cit.*

[8] National Science Foundation, *Detailed Statistical Tables. Federal Support to Universities, Colleges, and Selected Nonprofit Institutions, Fiscal Year 1974* (NSF 75-325) (Washington, D.C. 20550, 1975.)


R&D expenditures at universities and colleges, by source and type of institutional control: FY 1975
Private: $1.2 billion
Public: $2.2 billion
Non-Federal
SOURCE: National Science Foundation

Since 1968 the concentration of Federal R&D funds in public schools has declined from 66 percent to 59 percent, while during this period the concentration of full-time scientists and engineers employed in public universities has increased from 64 percent to 70 percent.[9]

[9] National Science Foundation, *Manpower Resources for Scientific Activities at Universities and Colleges, January 1975*, (NSF 76-311) (Washington, D.C. 20402: Supt. of Documents, U.S. Government Printing Office, 1976.)

Selected science resources at universities and colleges by institutional control: FY 1975

Resources	Percent distribution	
	Public	Private
R&D expenditures financed by Federal sources	59	41
R&D expenditures financed by non-Federal sources	76	24
Federal obligations for non-R&D activities	63	37
Full-time S/E graduate students	73	27
Full-time scientists and engineers	70	30

SOURCE: National Science Foundation

Type of Institution

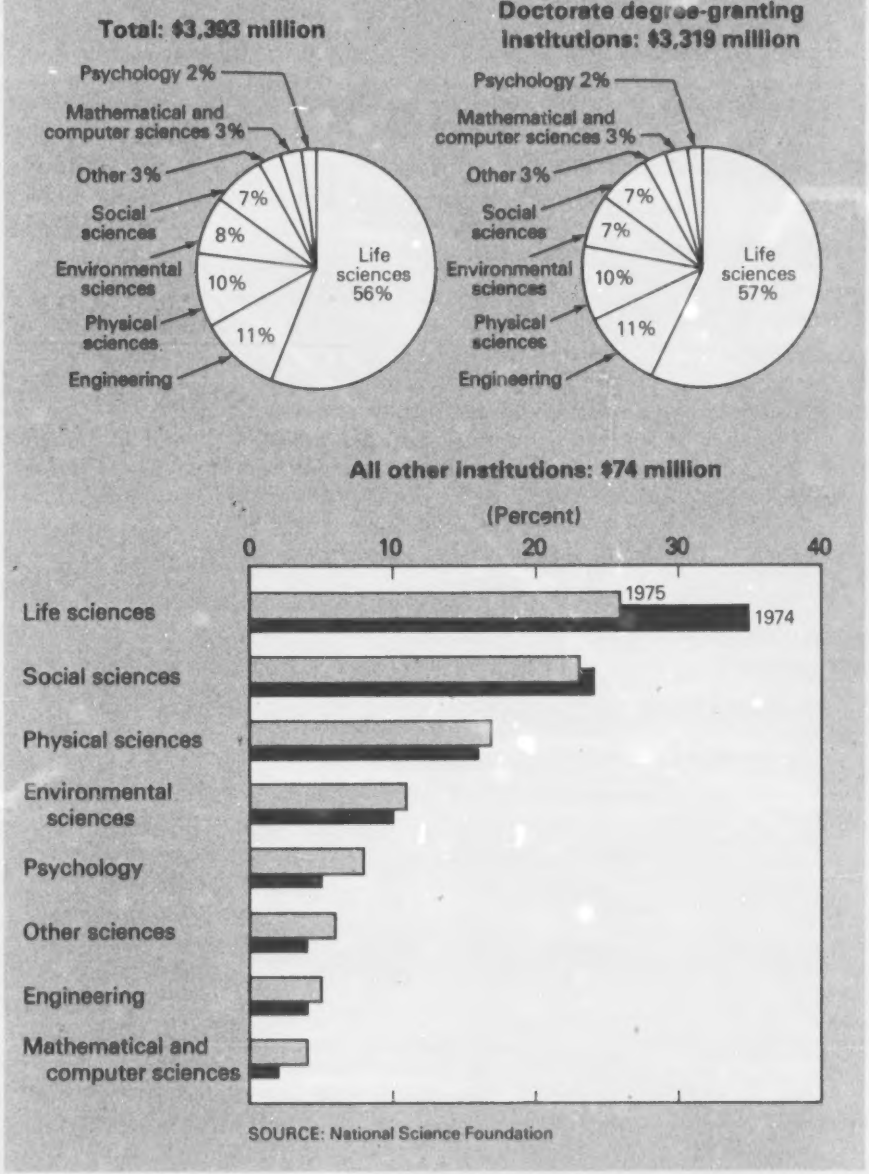
The total number of doctorate-degree-granting institutions, although representing only 54 percent of the surveyed institutions, accounted for 98 percent of all R&D expenditures in the academic sector. This concentration of R&D expenditures exceeded the density of full-time scientists and engineers employed in doctorate-granting universities—63 percent. Characteristics of doctorate-granting institutions closely paralleled total R&D spending patterns. Distribution variances were more pronounced within the nondoctorate groups.

During the 1974-75 period, academic performance in the nonscience and bachelor's-degree-granting institutions showed sizable increases of 65 percent and 19 percent, respectively, while master's-degree-granting universities and colleges registered an 8-percent decline.

Increases from 1 percent to 3 percent were evident in 1975 in six of the eight fields of science. Life sciences, which accounted for over one-fourth of nondoctorate expenditures, reflected the largest decrease, 9 percent, while social sciences ranking second in R&D performance registered a decline of 1 percent.

Both doctorate and nondoctorate institutions revealed a striking similarity in current levels of Federal support for R&D performance. The Federal share represented 67 percent of the doctorate institutions' R&D total and 68 percent of the nondoctorate total. A shift in Federal support however, may be reflected by increases of 6 percent and 3 percent in master's- and bachelor's-degree-granting institutions, while the Federal share in institutions not granting science degrees showed a marked decline of 26 percent.

R&D expenditures at universities and colleges, by field and type of institution: FY 1975



SOURCE: National Science Foundation

Geographic Distribution

For the first time, the Pacific States ranked first in R&D expenditures, $627 million. Their rate of growth during 1974-75 was nearly double that of the Middle Atlantic States, which had ranked first in R&D expenditures since 1964. The Pacific States also ranked second in the number of full-time scientists and engineers who were primarily engaged in R&D activities. The release of Federal funds in 1974 resulted in expanded and widespread increases in R&D activities in all areas of the United States. In the 1975 reporting period, all geographic areas reported increases, ranging from 5 percent in outlying areas to 17 percent in the East South Central region. The New England States demonstrated a dramatic growth fluctuation. Following a 12-percent decline during 1973-74, R&D spending in this region increased 13 percent in 1975.

California and New York combined represented one-fourth of the total R&D performance and one-fifth of full-time scientists and engineers employed in universities and colleges. The addition of the next six States—Massachusetts, Texas, Illinois, Pennsylvania, Michigan, and Wisconsin, each with over $100 million in R&D expenditures—brings the leading eight States' share of R&D expenditures to 53 percent. In contrast, 12 States that spent under $15 million in research and development accounted for only 3 percent of all academic R&D expenditures in 1975.

The 10 States leading in R&D expenditures at universities and colleges: FY 1964-75

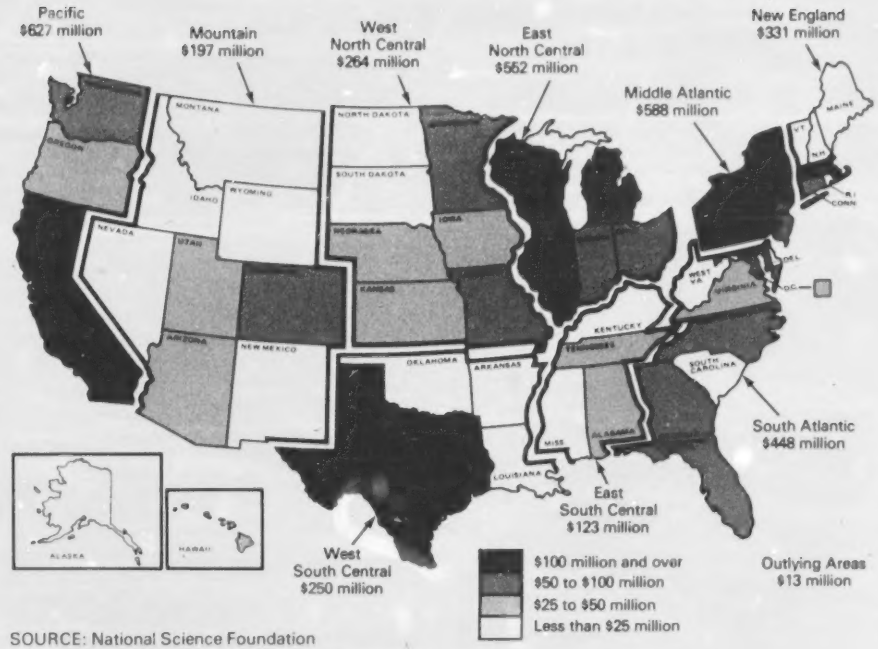
[Dollars in millions]

State	1964	1966	1968	1970	1972	1973	1974	1975	Percent change 1974-75
Total, all States	$1,275	$1,715	$2,149	$2,335	$2,677	$2,940	$3,017	$3,393	12.5
	Percent distribution								
California	11.4	11.6	11.4	10.5	12.1	12.9	13.0	13.5	16.9
New York	11.7	12.1	12.4	11.7	11.5	11.9	11.4	11.5	13.2
Massachusetts	8.0	8.9	8.7	8.7	8.8	8.3	6.7	6.6	9.7
Texas	3.4	3.7	4.1	4.4	4.4	4.7	5.1	5.2	15.2
Illinois	6.1	5.4	5.1	4.5	4.6	4.5	4.7	4.6	9.1
Pennsylvania	5.6	5.5	5.8	5.6	4.8	4.5	4.8	4.2	-1.1
Michigan	4.1	4.1	3.6	3.7	3.7	3.8	3.6	3.8	18.4
Wisconsin	2.8	3.1	3.2	3.3	3.1	3.3	3.3	3.3	10.7
Ohio	3.1	3.0	3.2	3.1	2.7	2.6	2.7	2.8	14.6
Maryland	2.8	2.5	2.5	2.3	2.4	2.4	2.6	2.7	13.8
All other States[1]	41.0	40.1	40.0	42.2	41.9	41.1	42.1	41.8	12.3

[1] Includes outlying areas and offices abroad.

SOURCE: National Science Foundation

R&D expenditures at universities and colleges by State: FY 1975



SOURCE: National Science Foundation

California remained the leading State in R&D expenditures with a 17-percent increase between 1974 and 1975 followed by New York and Massachusetts with increases of 13 percent and 10 percent, respectively. New Hampshire reported the largest rate of growth, 38 percent. Twenty-one other States reported increases of 15 percent or more, while only three—Kansas, Utah, and Pennsylvania—reflected declines.

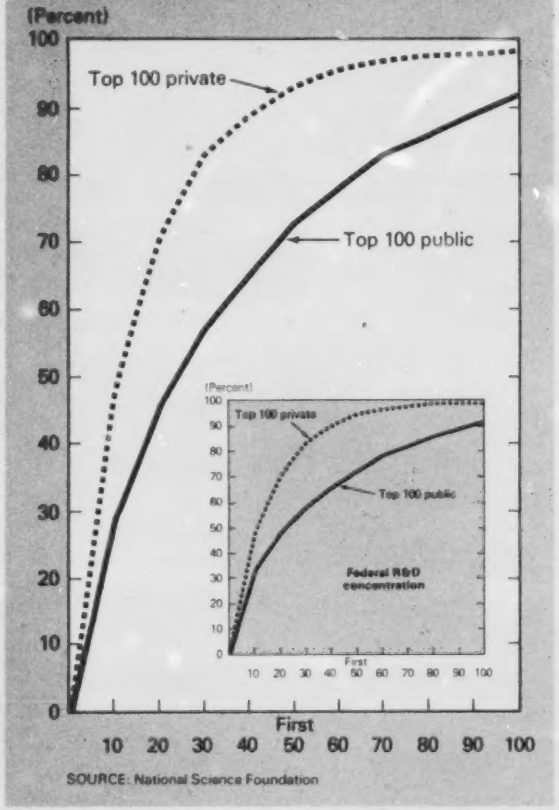
The Pacific States also ranked first in federally financed R&D expenditures, with $475 million reported in 1975. The Middle Atlantic States ranked second with $410 million. The two most populous States were also the leading recipients of Federal R&D support. Federally financed R&D expenditures in California totaled $360 million in 1975, followed by New York with $276 million. In fact, 7 of the 10 States leading in R&D expenditures ranked among the 10 leading States in number of full-time scientists and engineers employed by universities and colleges as of January 1975.

Since 1964 the Pacific States have reported the fastest growth in federally financed R&D dollars, an average of 12 percent per year. In contrast, federally financed R&D funding increased at the slowest pace in the New England and Middle Atlantic States—7 percent per year during this period.

Concentration of R&D Expenditures

The concentration of total and federally financed R&D expenditures remained virtually unchanged between 1974 and 1975. The top 20 R&D performers continued to account for 36 percent of total R&D spending and 40 percent of federally sponsored funds. Since 1966, however, the density of both total and Federal R&D expenditures within the top 20 institutions has declined from 41 percent and 45 percent, respectively.

Concentration of R&D expenditures at the 100 leading universities and colleges by type of institutional control: FY 1975



In 1975, 91 of the 100 largest R&D performers reported increases in R&D spending, and 71 of these reported R&D growth rates of at least 10 percent in contrast to 1974, when only 77 of the top 100 institutions expanded their R&D activities and only 36 of these reported increases over 10 percent. The change is even more striking for federally financed R&D performance. In 1975, 93 of the top 100 Federal R&D performers reported increases, and 70 of these by over 10 percent, compared to 1974, when 59 of the 100 largest Federal R&D performers reported increases and 22 of these showed 10 percent or more.

Public institutions contrasted sharply with private institutions when analyzed by the sources of research funding. There is a trend towards wider dispersion of research among public institutions. The top 100 public institutions accounted for 92 percent of Federal R&D dollars in the public sector, in contrast to the top 100 private schools which spent 99 percent of federally supported funds going to that sector. Finally, the concentration of non-Federal funds in the leading 100 private schools, 98 percent, exceeds the concentration within public schools, 92 percent.

The concentration of R&D expenditures among the different fields of science were similar in 1975. R&D expenditures in the environmental sciences were the most highly concentrated, with 50 universities and colleges accounting for 84 percent of that field's total R&D spending. The level of R&D spending was most diversified in the life sciences, where the leading 50 institutions performed 65 percent of the R&D programs.

Following the close-out of the 1975 survey, the University of Pennsylvania revised its 1974 and 1975 submissions. Unfortunately, the printing schedule did not allow the National Science Foundation time to include the revised data in the *Detailed Statistical Tables* (NSF 76-316) nor in the tabulations and analysis contained in this report. The revisions indicate that the University of Pennsylvania expended $53 million for R&D activities in 1975, up 14 percent from 1974. Federal support at this university totaled $38 million, or 10 percent above 1974 levels. Future National Science Foundation publications will contain these updated data.

Universities and colleges grouped by the largest R&D programs: FY 1966-75

[Percent]

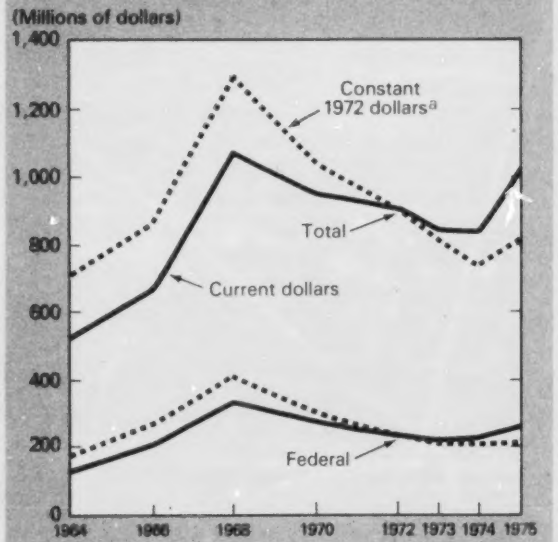
Institutional group	1966		1968		1970		1972		1973		1974		1975	
	Total	Federal	Total	Federal	Total	Federal	Total	Federal	Total	Federal	Total	Federal	Total	Federal
1-20	41	45	40	43	38	40	38	41	37	41	36	40	36	40
21-50	26	24	26	22	26	25	26	24	26	24	26	24	26	23
51-100	20	19	21	21	21	20	20	19	20	18	21	19	21	20
All other	12	12	14	14	16	15	17	16	17	17	17	17	17	17

SOURCE: National Science Foundation

Section 2. CAPITAL EXPENDITURES FOR RESEARCH, DEVELOPMENT, AND INSTRUCTION IN THE SCIENCES AND ENGINEERING

The turning point in the level of capital expenditures for scientific and engineering activities at universities and colleges was reached in 1975, when it totaled $1 billion, a 22-percent jump from 1974 and the first increase since 1968. In constant dollars, the increase amounted to 10 percent. During the 1964-68 period, increased levels of Federal support of research influenced universities and colleges to double their capital spending for S/E facilities and equipment. The period 1968-74, however, witnessed reduced Federal support of research, so that capital expenditures decreased at an average rate of 4 percent per year to $837 million in 1974. In constant dollars, capital spending decreased at an average annual rate of 9 percent in the 1968-74 period. The sudden surge in capital spending in the 1974-75 period accompanied an 8-percent increase in full-time graduate S/E enrollment at doctorate-granting institutions between 1974 and 1975. This increase was the second consecutive rise in graduate enrollment in the sciences and engineering after 4 years of successive decreases. Federal funding for research and development in the sciences and engineering has also been on the rise as stated earlier.

Capital expenditures for scientific activities at universities and colleges: FY 1964-75

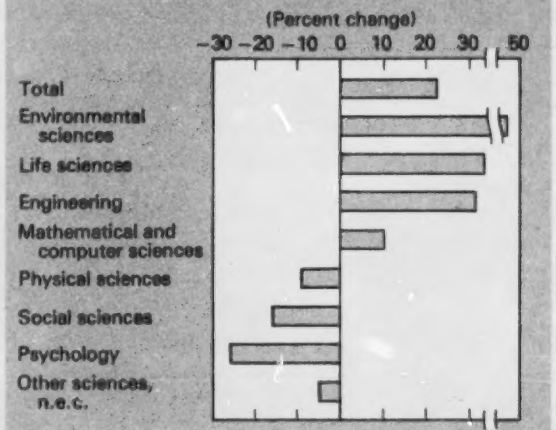


[a] Based on GNP implicit price deflator.
SOURCE: National Science Foundation

Federally supported capital spending, which increased 19 percent in the 1974-75 period, maintained its 27-percent share of the capital spending total in both years. Shifts in Federal capital funding since 1964 have, for the most part, closely paralleled changes in rates of growth and declines in total academic research spending.

Life sciences, the leading field in terms of capital expenditures, accounted for nearly all of the increase ($164 million of the $181 million increase) in the 1974-75 period. Capital funding within engineering and the environmental sciences rose by $28 million and $11 million, respectively. These three science fields together accounted for four-fifths of all capital expenditures in the sciences and engineering. The mathematical and computer sciences field was the only other area to show an increase during this period.

Capital expenditures for scientific activities at universities and colleges by field: FY 1974-75

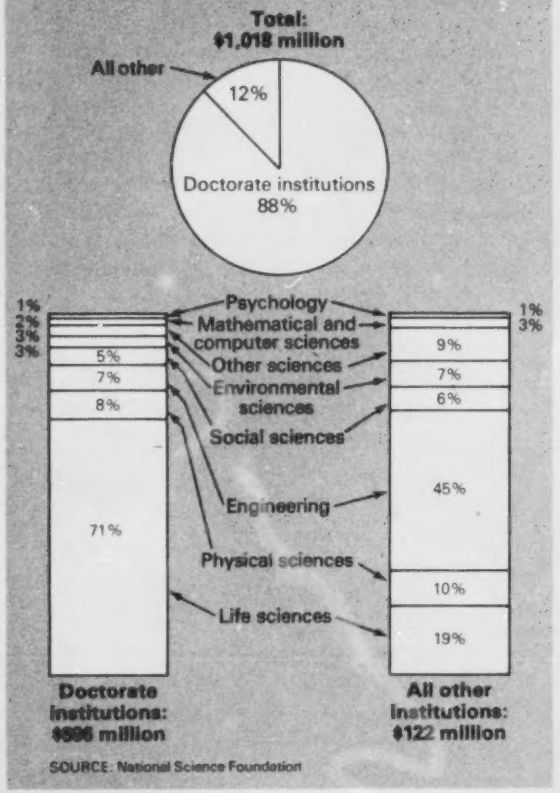


SOURCE: National Science Foundation

During the 1974-75 reporting period, both doctorate- and nondoctorate-granting institutions demonstrated substantial increases in capital spending. Since 88 percent of all capital expenditures in the academic sector were made at doctorate institutions, the distribution of their funds by field and source were similar to the total for all institutions surveyed. Nondoctorate-granting universities and colleges, although accounting for only 12 percent, showed a broader distribution by field. While doctorate institutions concentrated nearly three-fourths of their capital expenditures in the life sciences, nondoctorate institutions allocated a similar proportion in engineering, the life, and physical sciences combined. The Federal Government increased its portion of capital expenditures in nondoctorate schools from 42 percent in 1974 to 47 percent in 1975, compared to a decline in Federal funding at doctorate universities and colleges whose federally financed capital expenditures were predominately concentrated in the life sciences—78 percent, nondoctorate schools spent 88 percent of their Federal funds in engineering. The U.S. Naval Academy, ranking first in federally financed capital expenditures and second in total capital spending accounted for 79 percent of all Federal capital funding in engineering in 1975.

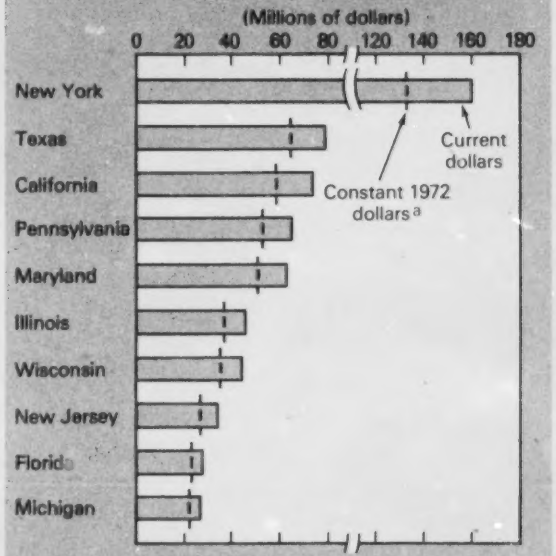
The 10 States leading in terms of capital expenditures accounted for $626 million, or 61 percent of the total in 1975. New York's return as the leading State with $165 million in capital spending was boosted by the large outlays for new and expanded facilities and equipment at CUNY Mt. Sinai School of Medicine. Institutions in Texas ranked second with $79 million, a 60-percent increase that moved them ahead of California. Florida and Michigan moved into the top 10 as a result of overall institutional increases in capital funds. Of the 10 leading States during this period, Maryland experienced the greatest relative change, up 72 percent, whereas Wisconsin and New Jersey reduced spending by 22 percent and 14 percent, respectively.

Capital expenditures for scientific activities at universities and colleges, by type of institution and field: FY 1975



SOURCE: National Science Foundation

10 States leading in capital expenditures for scientific activities at universities and colleges: FY 1975

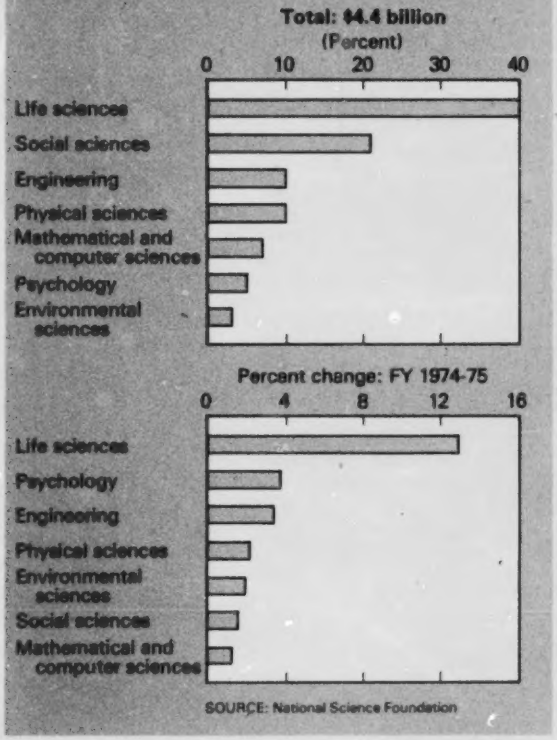


a Based on GNP implicit price deflator
SOURCE: National Science Foundation

Section 3. EXPENDITURES FOR INSTRUCTION AND DEPARTMENTAL RESEARCH AT GRADUATE-DEGREE-GRANTING INSTITUTIONS IN THE SCIENCES AND ENGINEERING

Most academic institutions cannot easily identify expenditures for departmental research (see technical notes). As a result, the aggregate data for departmental research shown by field of science should be used with prudence.

Expenditures for instruction and departmental research at graduate-degree-granting institutions by field: FY 1975



SOURCE: National Science Foundation

Expenditures for instruction and departmental research totaled $4.4 billion in 1975 at graduate-degree-granting universities and colleges, up 7 percent from 1974. The life sciences accounted for two-fifths of the total and also showed the largest relative gain, 13 percent. No other major field of science reported an increase of more than 4 percent.

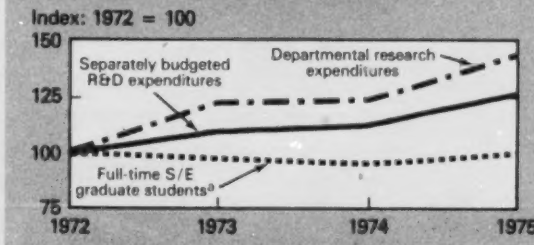
In 1975, estimates for the portion of total instructional expenditures being earmarked for departmental research ranged from 10 percent in psychology to 13 percent in the life sciences. When the institutions' estimates were converted into dollars, the total for departmental research in 1975 was $508 million, up 15 percent from 1974. All fields of science experienced increases in the 1974-75 period, with the life sciences accounting for about three-fifths of the overall growth in departmental research spending.

Public institutions accounted for 75 percent of departmental research in 1975, compared to 74 percent in 1974 and 73 percent in 1973. This trend parallels a similar trend for total instructional spending at public institutions in 1975.

The growth rate of departmental research in graduate-degree-granting institutions has exceeded the growth of full-time graduate students and of separately budgeted R&D expenditures since fiscal 1972, when data on all three sources were first available.

Increasing numbers of institutions have begun to separately budgeted departmental research expenditures. The net effect of this trend may result in increases in separately budgeted data reported by these institutions at the expense of departmental research.

Departmental research and separately budgeted R&D expenditures at universities and colleges: FY 1975



[a]Data for full-time graduate students are collected in the fall of each academic year. In this chart, however, the data have been adjusted in accordance with the equivalent fiscal year.
SOURCE: National Science Foundation

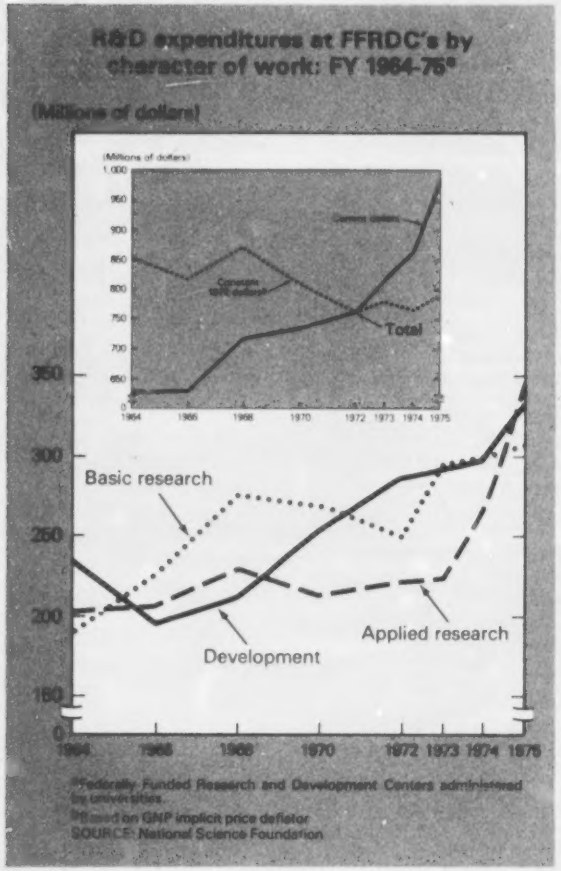
Part II
FEDERALLY FUNDED RESEARCH AND DEVELOPMENT CENTERS ADMINISTERED BY UNIVERSITIES

The following section discusses summary data from the 22 FFRDC's administered by universities and university consortia. Data presented here are excluded from those for universities and colleges shown in part I of this report.

Overview

Federally Funded Research and Development Centers (FFRDC's) are R&D-performing organizations exclusively or substantially financed by the Federal Government to achieve either a specific R&D purpose or to provide major facilities at universities for research and related training. Though they perform R&D work on direct request of, or under a broad charter from, sponsoring Federal agencies, the FFRDC's are organizationally separate from the administering institutions and are independent entities in regard to their R&D work. As in 1974, Federal funds accounted for 99.6 percent of all R&D expenditures at FFRDC's.

The 22 FFRDC's surveyed expended $987 million for research and development in 1975, an increase of 14 percent in current dollars over the $865 million expended in 1974. This upswing included a 30-percent jump in applied research expenditures over 1974 levels. R&D expenditures at FFRDC's have increased at an average annual rate of 4 percent since 1964. In constant dollars, however, over the same period, they have declined at an average annual rate of 1 percent.



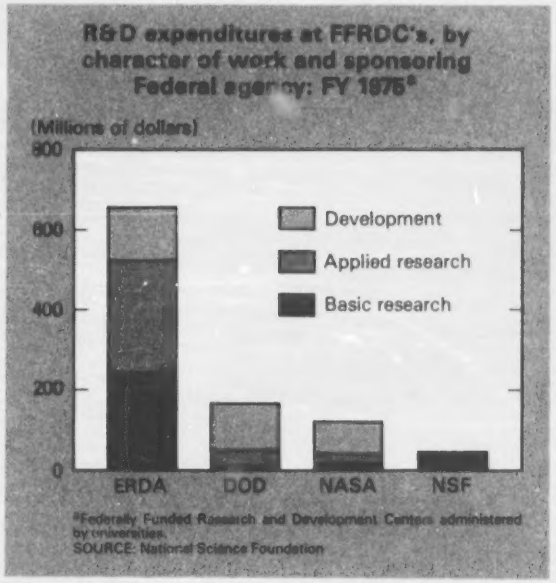
*Federally Funded Research and Development Centers administered by universities.
†Based on GNP implicit price deflator
SOURCE: National Science Foundation

Character of Work

Basic research spending by FFRDC's increased 3 percent from 1974 to $307 million, consistent with the average annual growth rate of 4 percent since 1964. When converted to constant dollars, however, basic research expenditures declined 7 percent in 1975 compared to an average decline of 1 percent per year between 1964 and 1975. As a result, for the first time since 1964, basic research as a proportion of the total R&D effort at FFRDC's, 31 percent, has been surpassed by both applied research and development. This contrasts sharply with spending by universities and colleges, where basic research has consistently represented over 70 percent of the total R&D effort.

As previously mentioned, applied research expenditures rose 30 percent in current dollars to $347 million, and accounted for 35 percent of the total R&D picture. For the first time, this was the primary R&D activity at FFRDC's. Two FFRDC's sponsored by the Energy Research and Development Administration (ERDA)—the Lawrence Livermore Laboratory, which was primarily involved in weapons research, and the Los Alamos Scientific Laboratory, which reported large energy programs—accounted for most of the 1974-75 expansion in applied research. Since 1964, applied research spending rose at an average rate of 5 percent per year in current dollars and less than 1 percent per year in constant dollars.

Expenditures for development jumped 12 percent in 1975 to $333 million, or in current-dollar terms, at a 3-percent average annual rate since 1964. When converted to constant dollars, they declined at an average annual rate of 2 percent during the same period. ERDA centers, particularly the Los Alamos Scientific Laboratory and the Argonne National Laboratory (which is involved primarily in nuclear science), accounted for virtually all of the increase in development.



*Federally Funded Research and Development Centers administered by universities.
SOURCE: National Science Foundation

Agency Trends

Expenditures at ERDA-sponsored FFRDC's grew 20 percent between 1974 and 1975 to $656 million, primarily because of a surge in development (up 34 percent), and applied research (up 32 percent). The Los Alamos Scientific Laboratory, the Lawrence Livermore Laboratory, and the Argonne National Laboratory reported R&D spending increases of $31 million, $25 million, and $22 million, respectively, and were largely responsible for ERDA's overall increase in R&D support.

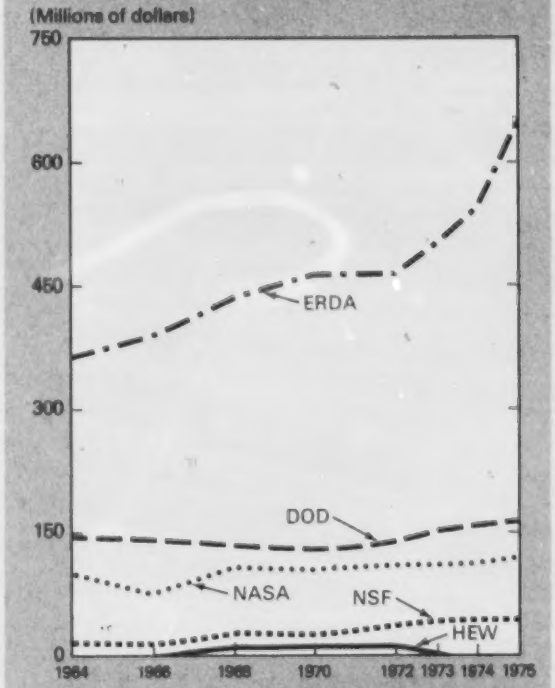
FFRDC's sponsored by the National Science Foundation (NSF) reported $46 million in R&D expenditures in 1975, nearly the same level as in 1974. The National Center for Atmospheric Research comprised one-half ($23 million) of NSF-sponsored R&D spending.

In ERDA-sponsored FFRDC's, applied research comprised 43 percent of the total R&D effort in 1975, while basic research accounted for 37 percent and development for 20 percent. In contrast, the four centers sponsored by the Department of Defense (DOD) spent 73 percent of their R&D outlays on development, and the two centers sponsored by the National Aeronautics and Space Administration (NASA) earmarked 65 percent of the R&D effort for development programs. NSF-sponsored centers spent all their outlays on basic research projects.

Over four-fifths of the total R&D expenditures at university-administered FFRDC's were geared to the physical sciences and engineering. Emphasis on particular disciplines varied among the different Federal agencies. For example, both ERDA- and DOD-sponsored centers concentrated over four-fifths of their support in the physical sciences and engineering. Centers sponsored by NSF, however, concentrated all their efforts on the physical and environmental sciences, while NASA-sponsored centers spent three-fourths of their funds on engineering and the mathematical sciences.

ERDA-sponsored FFRDC's accounted for 86 percent of the R&D effort in the physical sciences. The Lawrence Livermore Laboratory and the Los Alamos Scientific Laboratory comprised over one-half of ERDA's effort in the physical sciences. Four-fifths of the overall engineering R&D spending ($278 million) was sponsored by ERDA and DOD, while one-half of the R&D monies in the mathematical sciences were concentrated at the Jet Propulsion Laboratory.

R&D expenditures at FFRDC's by sponsoring Federal agency: FY 1964-75[a]



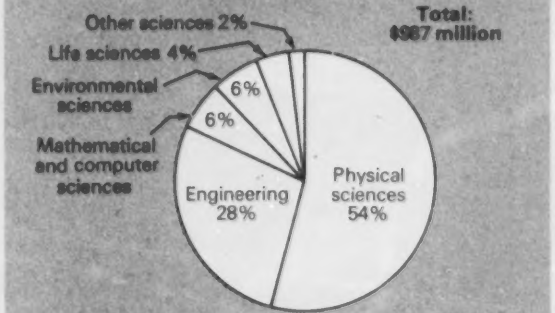
[a]Federally Funded Research and Development Centers administered by universities.
SOURCE: National Science Foundation

Field of Science

R&D spending by FFRDC's in the life sciences ($44 million) amounted to only 4 percent of the total R&D effort, in contrast to 56 percent of the total in universities and colleges. The physical sciences ($533 million) accounted for 54 percent of all R&D spending in the FFRDC's but only represented 10 percent of the R&D total in universities and colleges.

With the exception of psychology, all S/E fields received a greater amount of R&D funds in 1975 than in 1974. R&D spending increased 17 percent over 1974 in the physical sciences, and this growth was primarily due to expanded physics programs. For example, magnetic fusion energy programs, in which light nuclei are fused together to produce thermonuclear reactions at the Los Alamos, Lawrence Livermore, and Plasma Physics Laboratories have contributed to the physics boom. In addition, a large meson physics facility has been put into operation at the Los Alamos Scientific Laboratory.

R&D expenditures at FFRDC's by field: FY 1975[a]



[a]Federally Funded Research and Development Centers administered by universities.
SOURCE: National Science Foundation

Since 1964, R&D funding for both the environmental sciences and engineering have shown the largest average annual growth rates of any science fields, 7 percent and 5 percent, respectively. Between 1964 and 1975, both the physical and mathematical sciences averaged 4-percent increases per year, and the life sciences, 1 percent annually. Psychology and the social sciences registered declines.

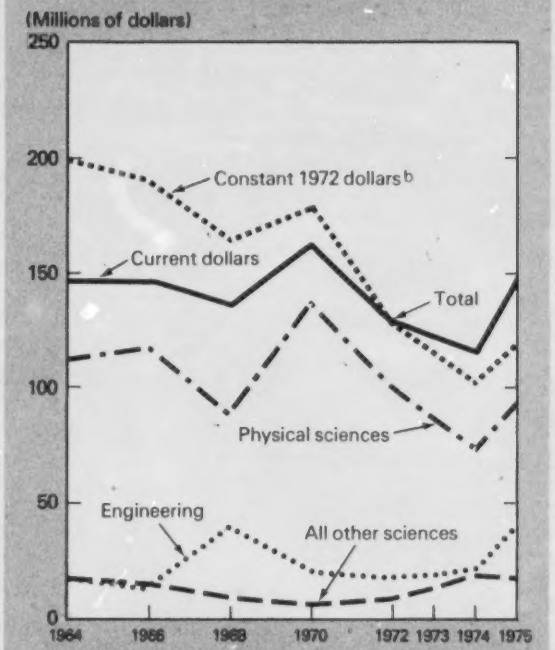
As in previous years, the Lawrence Livermore Laboratory was the largest R&D performer, with a $172 million total, over 90 percent of which was concentrated in the physical sciences in large programs in nuclear weapons research. Other physical science programs at this facility included a laser fusion program, a magnetic fusion (controlled thermonuclear research) program, an advanced isotope separation project designed to find a cheaper way to get enriched uranium for nuclear plants, and an energy and resources program. The Los Alamos Scientific Laboratory was the second largest FFRDC performer with $162 million, and both weapons research and energy research were emphasized in 1975.

Capital Expenditures for Facilities and Equipment

Capital expenditures for S/E facilities and equipment at university-administered FFRDC's totaled $148 million in 1975, a $33 million increase over 1974, which amounted to a reversal from the declining trend that began in 1970. The level of capital expenditures in this sector is roughly equivalent to the 1964 level—$147 million. In constant dollars, total capital expenditures have declined at an average rate of 5 percent per year at FFRDC's since 1964.

Capital spending in the physical sciences and engineering together increased by $35 million. The National Radio Astronomy Observatory and the Los Alamos Scientific Laboratory were largely responsible for the surge in the physical sciences. The Los Alamos Laboratory, which reported the highest level of capital expenditures—$27 million—concentrated its funds on a large meson physics facility.

Capital expenditures for scientific activities at FFRDC's by field: FY 1964-75[a]



[a]Federally Funded Research and Development Centers administered by universities.
[b]Based on GNP implicit price deflator
SOURCE: National Science Foundation

APPENDIXES

A. Technical Notes
   - Imputation for Nonresponse
   - Limitations
   - Efforts to Improve Data Quality
   - Deflators

B. Statistical Tables
   - Universities and Colleges (Part I)
   - Federally Funded Research and Development Centers (Part II)

C. Reproduction of Covering Letter and Survey Forms

NOTE

The detailed statistical tables for this volume for parts I and II, appendix B, were published separately under one cover (NSF 76-316) in 1976. Included in this volume are appendix B summary tables 3, 7, 16, 41, and 47, as well as a complete listing of all the tables. Detailed Statistical tables may be obtained gratis from the National Science Foundation, Washington, D.C. 20550.

APPENDIX A

Technical Notes

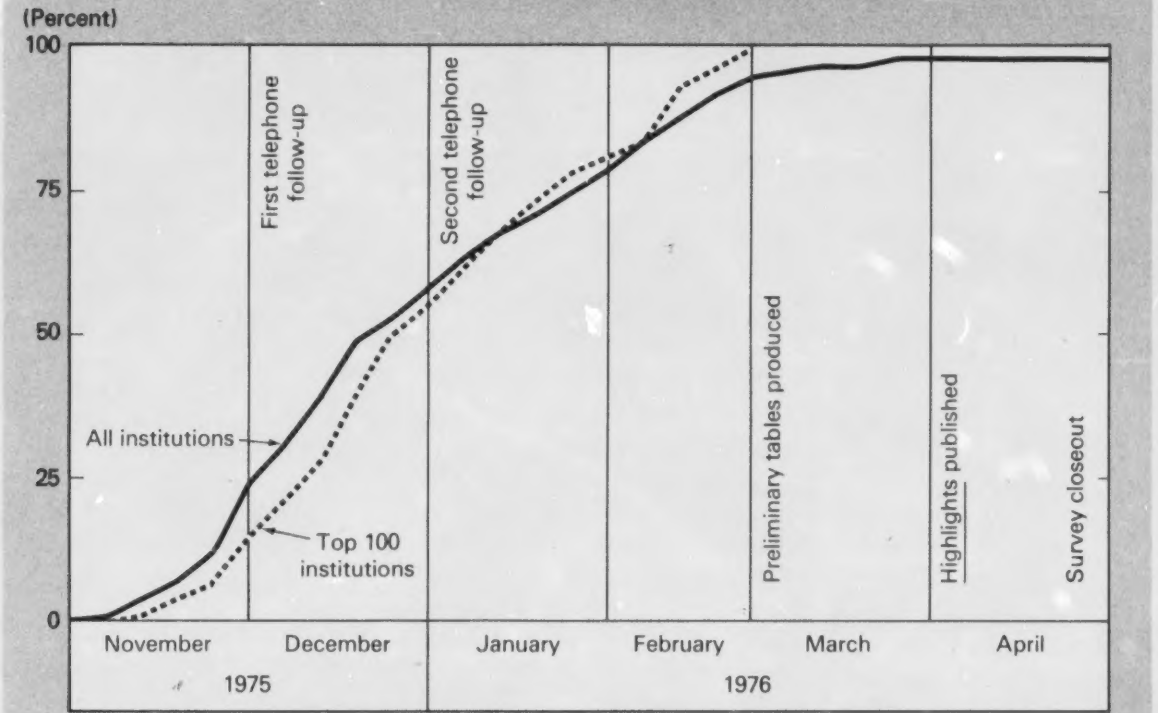
On October 26, 1975, survey questionnaires were mailed to 540 universities and colleges and 22 university-administered Federally Funded Research and Development Centers (FFRDC's). Essentially the same criteria in 1975 were used in establishing the survey universe that were employed for the fiscal year 1973 and 1974 surveys. The universe included all academic institutions granting graduate degrees in the sciences or engineering, and all other universities and colleges with over $50,000 in R&D expenditures as discussed in part I. The 22 university-administered FFRDC's were surveyed separately, and data from these institutions are reported and analyzed in part II of this report.

The R&D expenditures reported by this survey's 540 universities and colleges are estimated to account for over 99 percent of all academic R&D spending. Information gathered from the 1972 survey when over 1,600 additional universities and colleges were surveyed indicated that all other institutions of higher education accounted for less than 1 percent of total R&D spending.

Six months after the mailout (April 23, 1976), 98 percent of the institutions, including the 100 leading R&D performers in the academic sector, had responded with usable data. This excellent response rate, accomplished by improvements in data processing techniques, enabled NSF to produce preliminary results for 1975 within 6 months of the survey mailout. In May 1976, NSF released a *Science Resources Studies Highlights*[1] based on these preliminary survey results, and in August 1976 the *Detailed Statistical Tables* (NSF 76-316) were published containing final data tabulations. Thus, within 10 months from the initial mailout of the questionnaire, NSF released the final published results of the survey.

[1] National Science Foundation, *Science Resources Studies Highlights*, "Academic R&D Spending Up 12 Percent in FY 1975" (NSF 76-307) (Washington, D.C., May 4 1976.)

Institutional response rate to the Survey of Scientific and Engineering Expenditures at Universities and Colleges: FY 1975



Imputation for Nonresponse

Eleven institutions failed to respond to the survey questionnaire and a machine imputation program was developed to provide estimates for these institutions. The imputation program for nonrespondents was based on detailed summary data according to respondent institution characteristics (level of degree granted and type of control) to determine inflation factors. These factors were applied to the previous years' responses to create nonrespondent estimates. R&D estimates for nonrespondents totaled $8 million, or slightly more than 0.2 percent of the $3.4 billion universe total. Only four doctorate-, four master's-, and three bachelor's-degree-granting institutions failed to respond to the survey (table A-1).

A detailed account of the imputation results is given in table A-2, which combines both machine-imputed totals and totals estimated by NSF. Previously, this table did not incorporate NSF estimates for some nonrespondent institutions. Generally, these NSF estimates were used to distribute R&D spending by character of work.

Table A-1.—Institutional response rate by type of institution: FY 1975

Type of institution	Number surveyed	Respondents	
		Number	Percent of total
Total	540	529	98.0
Doctorate	289	285	98.6
Master's	176	172	97.7
Bachelor's and no science degree	75	72	96.0

SOURCE: National Science Foundation

Limitations

In seeking R&D expenditure information from universities and colleges, data quality is constantly being evaluated. During the last few years, in cooperation with survey respondents and professional organizations concerned with higher education, NSF has sought to identify those areas where data quality might be improved. Four such areas exist within this survey:

1. Traditionally, NSF has recognized that the request for departmental research expenditure statistics (item 3 in the questionnaire) usually resulted in "soft" data estimates. Respondents repeatedly stated that more precise information for departmental research spending would best be obtained from department chairmen themselves. Therefore, the 1975 survey package included a departmental worksheet to assist respondents in computing estimates in this area. However, relatively few institutions employed these worksheets and data reported are still considered "soft." NSF has determined that departmental research tabulations should be published only for national totals.

   In an increasing number of institutions within the survey universe, departmental research is considered as a separately budgeted item. In accordance with a new proposal by the National Council for Higher Education Management System (NSHEMS) in its Program Classification Structure Manual, separately budgeted departmental research should be carried as a separate line item in institutional accounts. As a result of this proposed refinement in accounting practices, some institutions which had been reporting departmental research spending as an estimated percentage of the total instruction budget (item 3 of the questionnaire), now report such expenditures as part of their institution's contribution to separately budgeted R&D spending (item 1). The cumulative effect of this reporting variation has not yet been determined. NSF is planning, however, to try to determine the extent of this reporting change as part of its respondent field interviews.

2. The concept of "institutional funds," a component of the source of funds question (item 1) is being examined by NSF. As defined by the 1975 questionnaire instructions, institutional funds include "unreimbursable indirect costs associated with R&D financed by outside organizations." This statement was added to the definition upon the advice of many survey respondents who felt that NSF should be more explicit in requesting the total costs of academic R&D activities. Furthermore, NSF has been advised by institutional respondents that unrecovered indirect costs are a legitimate part of "institutional funds."

   Based on reporting practices evident in the finance survey and from the efforts of several university business officers, NSF has become aware of a wide variation of responses to the institutional funds question. Several institutional representatives have assisted NSF in determining that the concept of unreimbursed indirect costs is not carried on the books of many large universities in a consistent fashion, and, as a result, several universities reported that their institutional contribution to R&D funding was zero. Furthermore, those institutions including these costs in their responses used varying methods in so doing.

3. The importance of basic research to long-term technological development demonstrates the crucial need for information on these expenditures, since academic institutions account for 54 percent of total basic research expenditures in the United States. In addition to the overall level, members of the National Science Board and others have expressed the need for the distribution of basic research expenditure data by field of science. Traditionally, the finance survey has requested that respondents provide a percentage estimate of total and federally financed basic research spending in item 1. In the 1975 questionnaire, however, NSF asked for basic research data by field of science, on an optional basis. Since many respondents indicated that these data would best be obtained from department chairmen, NSF also included with the survey questionnaire a departmental worksheet. It was hoped that institutional respondents would utilize this instrument to provide the field of science estimates.

   Institutions were also asked if they would be able to respond to this request for basic research expenditures, distributed by field of science in the 1976 survey. While few institutions responded for 1975, over four-fifths of the institutions indicated they would attempt to provide estimates in the next survey. However, many of the leading R&D performers, accounting for over 83 percent of the academic basic research total, indicated they could *not* provide estimates because of lack of adequate records. Furthermore, the departmental worksheet appeared to be of marginal utility. No aggregate estimates for basic research by field could be computed from partial response to this question in 1975, although there were some indications that basic research was highly concentrated in several fields of science.

   A related problem was associated with reporting basic research expenditures by character of work. Prior to 1973, data on field of science were requested for basic and applied research expenditures *only* and not for development. In 1973, however, NSF requested both research and development expenditures to be reported by field of science. While development represents less than 5 percent of total academic R&D spending, its level within particular fields such as engineering proved to be significant.

Table A-2. R&D EXPENDITURES ESTIMATED FOR NONRESPONDENT UNIVERSITIES AND COLLEGES BY TYPE OF INSTITUTION: FY 1975 [1]

[DOLLARS IN THOUSANDS]

SOURCE, CHARACTER, AND FIELD	TOTAL		DOCTORATE		MASTER'S		BACHELOR'S		NO SCIENCE DEGREE	
	AMOUNT	PERCENT OF TOTAL	AMOUNT	PERCENT OF TOTAL	AMOUNT	PERCENT OF TOTAL	AMOUNT	PERCENT OF TOTAL	AMOUNT	PERCENT OF TOTAL
TOTAL	$ 8,258	0.2	$ 5,418	0.2	$ 2,594	5.3	$ 246	1.1	$ 0	0.0
SOURCE OF FUNDS:										
FEDERAL GOVERNMENT	6,446	.3	3,656	.2	2,735	8.6	55	.3	0	.0
STATE GOVERNMENTS	10,509	3.1	10,264	3.1	185	3.5	60	8.0	0	.0
LOCAL GOVERNMENTS	78	.5	54	.4	24	4.3	0	.0	0	.0
PRIVATE FOUNDATIONS AND VOLUNTARY HEALTH AGENCIES	16,862	10.2	16,741	10.4	80	2.8	41	2.2	0	.0
INDUSTRY	6,165	5.5	6,083	5.6	54	2.2	28	8.0	0	.0
OTHER SOURCES	543	.6	508	.6	29	3.2	6	2.0	0	.0
INSTITUTIONAL FUNDS	1,295	.3	1,069	.3	170	3.5	56	2.8	0	.0
CHARACTER OF WORK:										
BASIC RESEARCH	445,907	18.6	441,673	18.8	3,339	12.9	895	5.4	0	.0
APPLIED RESEARCH	186,407	21.9	184,553	22.3	1,796	10.3	58	1.3	0	.0
DEVELOPMENT	25,123	17.0	24,105	17.3	1,004	18.1	14	.9	0	.0
FIELD OF SCIENCE:										
ENGINEERING (TOTAL)	5,710	1.5	5,589	1.5	108	4.0	4	.4	9	7.3
PHYSICAL SCIENCES (TOTAL)	6,833	2.0	5,811	1.7	411	5.4	539	12.2	72	42.4
ASTRONOMY	144	.5	137	.5	5	6.8	2	1.4	0	.0
CHEMISTRY	3,548	2.9	2,828	2.5	200	4.9	517	24.8	3	21.4
PHYSICS	1,232	.7	975	.6	173	7.1	15	1.0	69	44.2
OTHER PHYSICAL SCIENCES, NEC	1,744	6.0	1,701	6.2	38	3.7	5	.8	0	.0
ENVIRONMENTAL SCIENCES (TOTAL)	44,807	17.6	43,904	17.8	312	5.2	17	2.4	574	36.7
MATHEMATICAL AND COMPUTER SCIENCES (TOTAL)	1,810	2.1	1,725	2.1	72	5.8	12	.8	1	1.1
MATHEMATICS	336	.8	268	.7	57	7.3	10	1.3	1	1.1
COMPUTER SCIENCE	1,427	3.1	1,408	3.2	15	3.2	4	.6	0	.0
LIFE SCIENCES (TOTAL)	5,652	.3	4,349	.2	1,191	8.1	93	1.9	19	79.2
BIOLOGICAL SCIENCES	5,073	.8	4,309	.7	533	7.4	212	6.8	19	79.2
AGRICULTURAL SCIENCES	982	.3	714	.2	253	4.8	15	1.3	0	.0
MEDICAL SCIENCES	7,229	.9	6,883	.8	341	27.3	5	1.3	0	.0
OTHER LIFE SCIENCES, NEC	185	.3	99	.1	84	10.0	2	.9	0	.0
PSYCHOLOGY (TOTAL)	1,078	1.3	614	.8	286	10.3	175	5.5	3	21.4
SOCIAL SCIENCES (TOTAL)	2,712	1.1	1,422	.6	980	9.2	237	3.6	73	82.0
ECONOMICS	1,189	2.1	1,014	1.9	113	8.9	62	9.6	0	.0
POLITICAL SCIENCE	551	1.9	477	1.7	65	7.3	9	3.1	0	.0
SOCIOLOGY	1,337	1.9	898	1.4	277	14.0	162	3.4	0	.0
OTHER SOCIAL SCIENCES, NEC	2,429	2.5	1,052	1.2	1,296	20.1	8	.8	73	82.0
OTHER SCIENCES, NEC (TOTAL)	2,616	2.7	1,873	2.0	149	4.7	6	.8	568	80.1

[1] The imputed dollar volume of separately budgeted R&D expenditures of nonrespondent institutions amounted to $8 million, or slightly more than 0.2 percent of the $3.4 billion universe total for all universities and colleges, both respondents and nonrespondents.

SOURCE: National Science Foundation

Efforts to Improve Data Quality

Several methods have been employed by NSF to improve survey data quality. Two studies, sponsored by NSF, gave initial insight into reporting problems and recommended improvements in survey design, concepts, and operation.

In 1973 Dr. Robert Wright of the State University of New York spent a year traveling to over 50 institutions of higher education. His interviews and investigations on reporting practices were incorporated into a two-volume study.[2]

In 1974 Columbia Research Associates conducted a pilot Post-enumeration Study in which nine of the largest academic R&D performers were sampled. The findings were used by NSF to identify and remedy data problems.[3]

Following these NSF-sponsored studies, two national conferences were convened to discuss the pertinent issues addressed in the finance survey, particularly regarding the reporting of indirect costs. Participants at these conferences represented professional organizations of higher education, university respondents, and data users from both the Federal level and the academic sector. In May 1975, at a conference held by the National Center of Higher Education Systems (NCHEMS) under contract from NSF, participants were asked to assess problem areas in the NSF university statistics program and to give counsel to NSF on methods of improving survey concepts and design.

In June 1976 an advisory panel convened by Moshman Associates under a contract from NSF pursued the work of the previous year's meeting, sponsored by NCHEMS, with particular attention paid to the questions of indirect cost reporting and the need for data on academic basic research expenditures by field of science. On the question of basic research, the university representatives on the panel indicated that NSF should encourage institutions to seek a way of identifying and working with the individual principal investigators in order to obtain more reliable estimates. All the conferees agreed that data on basic research by field of science, while hard to obtain, would be valuable to academic planners at the institutional as well as the Federal level.

The conferences and studies promoted by NSF have produced a fruitful dialogue among data users, survey respondents, and NSF staff. Increasing numbers of university officials are expressing interest in helping answer the questions arising from the collection of higher educational data, specifically on R&D expenditures.

[2] Robert R. Wright, *Evaluation of the Survey of Scientific Activities of Institutions of Higher Education*, 2 vols. (Washington, D.C.: National Science Foundation, 1973).

[3] William Morsch, *Pilot Post-Enumeration Survey*. (unpublished report. Columbia Research Associates, 1974.)

Deflators

Any analysis of trends in R&D expenditures must consider the effects of inflation upon academic research programs. This report utilizes the gross national product (GNP) implicit price deflator as the tool for determining the inflationary effect upon R&D funding. The application of the GNP implicit price deflator in institutions of higher education is known to present problems in the data because salaries play such a significant part in the costs of conducting research. In fact, in developing an R&D price index applicable to higher education, Dr. Kent Halstead indicated that since 1970 the true effects of inflation were more severe upon universities and colleges than on the economy as a whole.[4]

In recognition of the limitations inherent in the GNP price deflator, NSF, under a grant to the American Council on Education, is currently conducting a pilot study to develop an R&D price index based on a "market-basket" approach at two universities—Ohio State University and the University of California at Berkeley. The results of this project will be available in 1977.

[4] *Higher Education Prices and Price Indexes*, by D. Kent Halstead, Department of Health, Education, and Welfare, National Center for Education Statistics (Washington, D.C., 20402: Supt. of Documents, U.S. Government Printing Office, 1975.)

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DEPARTMENT OF DEFENSE

Department of the Navy
- Applied Physics Laboratory (Johns Hopkins University).
- Applied Research Laboratory (Pennsylvania State University).
- Center for Naval Analyses (University of Rochester).

Department of the Air Force
- Lincoln Laboratory (Massachusetts Institute of Technology).

ATOMIC ENERGY COMMISSION

- Ames Laboratory (Iowa State University of Science and Technology).
- Argonne National Laboratory (University of Chicago and Argonne Universities Association).
- Brookhaven National Laboratory (Associated Universities, Inc.).
- Cambridge Electron Accelerator (Harvard University and Massachusetts Institute of Technology).
- Lawrence Radiation Laboratory, Berkeley and Livermore (University of California).
- Los Alamos Scientific Laboratory (University of California).
- Fermi National Acceierator Laboratory (Universities Research Association).
- Oak Ridge Associated Universities
- Plasma Physics Laboratory (Princeton University).
- Stanford Linear Accelerator Center (Stanford University).

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

- Jet Propulsion Laboratory (California Institute of Technology).
- Space Radiation Effects Laboratory (College of William and Mary).

NATIONAL SCIENCE FOUNDATION

- Cerro-Tololo Inter-American Observatory (Association of Universities for Research in Astronomy, Inc.).
- National Astronomy and Ionosphere Center (Cornell University).
- Kitt Peak National Observatory (Association of Universities for Research in Astronomy, Inc.).
- National Center for Atmospheric Research (University Corporation for Atmospheric Research).
- National Radio Astronomy Observatory (Associated Universities, Inc.).

TABLE B-3. R&D EXPENDITURES IN UNIVERSITIES AND COLLEGES, BY SOURCE OF FUNDS, CHARACTER OF WORK, AND FIELD OF SCIENCE FOR SELECTED FISCAL YEARS: 1964-75

(DOLLARS IN THOUSANDS)

SOURCE, CHARACTER AND FIELD	1964	1966	1968	1970	1972	1973	1974	1975
TOTAL R&D EXPENDITURES	1,275,436	1,714,684	2,148,708	2,334,859	2,676,511	2,939,603	3,017,236	3,393,136
SOURCE OF FUNDS:								
FEDERAL GOVERNMENT	917,322	1,261,034	1,572,064	1,647,500	1,838,933	2,038,208	2,032,483	2,283,979
STATE GOVERNMENT	122,496	144,258	161,808	206,907	257,068	280,881	312,726	336,445
LOCAL GOVERNMENT	9,964	11,718	10,387	13,870	12,850	14,510	14,038	15,428
FOUNDATIONS & VOLUNTARY HEALTH AGENCIES	61,411	76,511	95,264	110,391	128,032	131,176	142,366	165,587
INDUSTRY	40,363	42,242	55,253	60,538	75,270	85,242	96,033	111,560
OTHER SOURCES	21,299	31,635	36,122	54,602	58,838	70,331	75,543	90,178
INSTITUTIONS' OWN FUNDS	102,581	147,286	217,810	243,051	305,520	319,255	344,047	389,959
CHARACTER OF WORK:								
BASIC RESEARCH	1,002,980	1,303,114	1,649,616	1,795,864	2,022,185	2,054,060	2,146,801	2,394,411
APPLIED RESEARCH	231,852	328,276	403,643	426,714	544,178	717,046	737,038	850,632
DEVELOPMENT	40,604	83,294	95,449	112,281	110,148	168,497	133,397	148,093
FIELD OF SCIENCE:								
ENGINEERING(TOTAL)	161,572	259,176	309,137	318,836	347,341	383,557	346,217	380,522
PHYSICAL SCIENCES(TOTAL)	216,989	286,707	319,739	307,310	329,900	330,437	333,359	350,340
ASTRONOMY	15,571	22,676	24,103	18,597	21,974	24,114	24,427	26,610
CHEMISTRY	70,022	87,955	104,695	102,002	110,015	114,136	116,099	121,337
PHYSICS	119,578	159,135	172,660	161,921	161,853	167,804	169,225	173,290
OTHER PHYSICAL SCIENCES, NEC	11,818	16,941	18,281	24,790	36,058	24,383	23,608	29,103
ENVIRONMENTAL SCIENCES(TOTAL)	54,814	68,019	120,463	125,315	192,331	209,648	234,989	255,033
MATHEMATICAL SCIENCES(TOTAL)	32,666	42,489	57,621	72,413	70,536	74,693	76,676	84,931
MATHEMATICS (EXCLUDING COMPUTER SCIENCES)	NA	NA	NA	NA	NA	36,955	37,544	39,609
COMPUTER SCIENCES	NA	NA	NA	NA	NA	37,738	39,132	45,322
LIFE SCIENCES(TOTAL)	681,594	872,336	1,037,031	1,194,249	1,352,601	1,529,290	1,626,020	1,895,008
BIOLOGICAL SCIENCES	315,471	422,483	490,607	547,193	451,239	557,497	509,611	604,251
AGRICULTURAL SCIENCES	(1)	(1)	(1)	(1)	2/ 231,057	2/ 275,552	346,209	381,953
MEDICAL SCIENCES	320,086	389,618	477,346	549,121	604,987	645,388	712,787	837,130
OTHER LIFE SCIENCES, NEC	46,037	60,235	69,078	97,935	65,318	50,553	57,413	71,674
PSYCHOLOGY(TOTAL)	31,904	40,143	59,286	59,250	70,400	73,858	74,328	79,880
SOCIAL SCIENCES(TOTAL)	81,539	109,279	167,986	168,669	206,344	232,185	239,950	249,929
ECONOMICS	24,068	31,695	35,017	38,616	46,586	47,807	47,989	56,112
POLITICAL SCIENCE	6,876	8,979	20,742	19,273	21,771	25,523	26,292	28,694
SOCIOLOGY	14,664	20,000	38,587	44,383	59,475	61,523	63,674	68,713
OTHER SOCIAL SCIENCES, NEC	35,931	48,605	73,640	66,397	78,512	97,332	101,995	96,410
OTHER SCIENCES, NEC. (TOTAL)	14,358	36,535	77,445	88,817	107,058	105,935	85,697	97,493

1 Not separately available, included in Biological sciences.

2 Estimated, based on data collected in 1974.

SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE B-6.

R&D EXPENDITURES IN DOCTORATE GRANTING UNIVERSITIES AND COLLEGES, BY SOURCE OF FUNDS, CHARACTER OF WORK, FIELD OF SCIENCE, AND CONTROL: FISCAL YEARS 1974-75

(DOLLARS IN THOUSANDS)

SOURCE, CHARACTER AND FIELD	TOTAL			CONTROL					
				PUBLIC			PRIVATE		
	1974	1975	% CHANGE 1974-75	1974	1975	% CHANGE 1974-75	1974	1975	% CHANGE 1974-75
TOTAL R&D EXPENDITURES	2,943,110	3,318,582	12.8%	1,859,262	2,126,301	14.4%	1,083,848	1,192,281	10.0%
SOURCE OF FUNDS:									
FEDERAL GOVERNMENT	1,985,597	2,233,019	12.5	1,140,471	1,302,350	14.2	845,126	930,669	10.1
STATE GOVERNMENT	301,163	330,374	9.7	274,969	303,345	10.3	26,194	27,029	3.2
LOCAL GOVERNMENT	13,242	14,819	11.9	8,447	9,410	11.4	4,795	5,409	12.8
FOUNDATIONS & VOLUNTARY HEALTH AGENCIES	138,659	160,534	15.8	60,442	74,541	23.3	78,217	85,993	9.9
INDUSTRY	93,861	108,693	15.8	56,914	68,200	19.8	36,947	40,493	9.6
ALL OTHER OUTSIDE SOURCES	73,735	88,475	20.0	43,078	52,809	22.6	30,657	35,666	16.3
INSTITUTIONS' OWN FUNDS	336,853	382,668	13.6	274,941	315,646	14.8	61,912	67,022	8.3
CHARACTER OF WORK:									
BASIC RESEARCH	2,108,300	2,350,340	11.5	1,217,668	1,371,491	12.6	890,632	978,849	9.9
APPLIED RESEARCH	710,652	828,533	16.6	545,356	638,445	17.1	165,296	190,088	15.0
DEVELOPMENT	124,158	139,709	12.5	96,238	116,365	20.9	27,920	23,344	-16.4
FIELD OF SCIENCE:									
ENGINEERING (TOTAL)	343,281	376,731	9.7	216,315	233,400	7.9	126,966	143,331	12.9
PHYSICAL SCIENCES (TOTAL)	321,816	338,088	5.1	181,461	193,869	6.8	140,355	144,219	2.8
ASTRONOMY	24,181	26,397	9.2	14,583	16,615	13.9	9,598	9,782	1.9
CHEMISTRY	110,783	115,121	3.9	65,236	67,420	3.3	45,547	47,701	4.7
PHYSICS	165,223	169,116	2.4	83,413	85,979	3.1	81,810	83,137	1.6
OTHER PHYSICAL SCIENCES, NEC	21,629	27,454	26.9	18,229	23,855	30.9	3,400	3,599	5.9
ENVIRONMENTAL SCIENCES (TOTAL)	227,906	246,740	8.3	169,423	181,869	7.3	58,473	64,871	10.9
MATHEMATICAL SCIENCES (TOTAL)	74,832	82,174	9.8	42,589	46,666	9.6	32,243	35,508	10.1
MATHEMATICS (EXCLUDING COMPUTER SCIENCES)	36,523	37,957	3.9	21,588	21,569	-.1	14,935	16,388	9.7
COMPUTER SCIENCES	38,309	44,217	15.4	21,001	25,097	19.5	17,308	19,120	10.5
LIFE SCIENCES (TOTAL)	1,600,244	1,875,501	17.2	997,850	1,190,037	19.3	602,394	685,464	13.8
BIOLOGICAL SCIENCES	499,793	593,895	18.8	269,475	330,259	22.6	230,318	263,636	14.5
AGRICULTURAL	334,535	375,507	12.2	315,586	355,492	12.6	18,949	20,015	5.6
MEDICAL	710,577	835,493	17.6	388,800	473,193	21.7	321,777	362,300	12.6
OTHER LIFE SCIENCES, NEC	55,339	70,606	27.6	23,989	31,093	29.6	31,350	39,513	26.0
PSYCHOLOGY (TOTAL)	70,234	73,525	5.3	46,083	50,643	9.9	24,151	23,282	-3.6
SOCIAL SCIENCES (TOTAL)	222,414	232,570	4.6	148,793	161,302	8.4	73,621	71,268	-3.2
ECONOMICS	46,445	54,192	16.7	32,740	39,499	20.6	13,705	14,693	7.2
POLITICAL SCIENCE	25,590	27,511	7.5	17,863	18,285	2.4	7,727	9,226	19.4
SOCIOLOGY	55,810	62,036	11.2	38,693	41,820	8.1	17,117	20,216	18.1
OTHER SOCIAL SCIENCES, NEC	94,569	88,831	-6.1	59,497	61,698	3.7	35,072	27,133	-22.6
OTHER SCIENCES, NEC	82,383	92,853	12.7	56,738	68,515	20.8	25,645	24,338	-5.1

SOURCE: NATIONAL SCIENCE FOUNDATION.

TABLE B-7.

FEDERALLY FINANCED R&D EXPENDITURES IN UNIVERSITIES AND COLLEGES, BY CHARACTER OF WORK, AND FIELD OF SCIENCE FOR SELECTED FISCAL YEARS: 1964-75

(DOLLARS IN THOUSANDS)

CHARACTER AND FIELD	1964	1966	1968	1970	1972	1973	1974	1975
TOTAL	$917,322	$1,261,034	$1,572,064	$1,647,500	$1,838,933	$2,038,208	$2,032,483	$2,283,979
CHARACTER OF WORK:								
BASIC RESEARCH	766,225	1,008,805	1,250,782	1,296,120	1,420,198	1,455,443	1,522,164	1,690,504
APPLIED RESEARCH	128,405	193,515	253,577	267,651	338,425	462,437	439,215	515,849
DEVELOPMENT	22,692	58,714	67,705	83,729	80,310	120,328	71,104	77,626
FIELD OF SCIENCE:								
ENGINEERING(TOTAL)	126,962	209,248	246,191	245,888	259,058	287,094	239,521	259,524
PHYSICAL SCIENCES(TOTAL)	187,457	247,603	273,048	257,822	267,392	270,384	269,783	284,664
ASTRONOMY	13,651	20,123	21,079	15,516	16,854	17,697	17,101	19,524
CHEMISTRY	55,410	68,955	82,668	78,942	84,582	86,862	88,692	92,721
PHYSICS	109,938	146,058	156,241	144,306	139,629	146,224	146,513	149,879
OTHER PHYSICAL SCIENCES, NEC.	8,458	12,467	13,060	19,058	26,327	19,601	17,477	22,540
ENVIRONMENTAL SCIENCES(TOTAL)	44,891	54,325	88,691	88,127	142,110	157,627	168.298	180,566
MATHEMATICAL SCIENCES(TOTAL)	28,128	34,394	45,610	54,338	53,207	55,487	57,974	64,868
MATHEMATICS (EXCLUDING COMPUTER SCIENCES)	NA	NA	NA	NA	NA	28,557	29,313	31,120
COMPUTER SCIENCES	NA	NA	NA	NA	NA	26,930	28,661	33,748
LIFE SCIENCES(TOTAL)	455,014	595,301	725,017	814,417	884,212	1,014,279	1,051,617	1,237,497
BIOLOGICAL SCIENCES	176,933	252,371	306,471	334,851	319,625	398,924	365,171	432,265
AGRICULTURAL SCIENCES	(1)	(1)	(1)	(1)	2/ 80,228	2/ 93,854	100,952	112,175
MEDICAL SCIENCES	256,874	312,801	381,936	431,656	448,805	485,962	543,467	641,507
OTHER LIFE SCIENCES, NEC.	21,207	30,129	36,610	47,910	35,554	35,539	42,027	51,550
PSYCHOLOGY(TOTAL)	27,572	34,393	48,547	47,263	54,865	58,649	58,554	61,193
SOCIAL SCIENCES(TOTAL)	42,147	61,914	100,846	94,655	113,935	132,471	136,172	139,785
ECONOMICS	10,565	15,520	17,537	17,688	20,940	22,776	22,224	27,081
POLITICAL SCIENCE	3,127	4,593	10,444	7,920	8,592	10,362	11,372	11,953
SOCIOLOGY	8,739	12,837	26,095	26,220	35,694	40,487	41,249	45,083
OTHER SOCIAL SCIENCES, NEC.	19,716	28,964	46,770	42,827	48,709	58,846	61,327	55,668
OTHER SCIENCES, NEC. (TOTAL)	5,151	23,856	44,114	44,990	64,154	62,217	50,564	55,882

1 Not separately available, included in Biological sciences.

2 Estimated, based on data collected in 1974.

SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE B-16.

TOTAL AND FEDERALLY FINANCED R&D EXPENDITURES IN UNIVERSITIES AND COLLEGES, BY INSTITUTION: FISCAL YEARS 1972-75

(DOLLARS IN THOUSANDS)

INSTITUTIONS RANKED BY TOTAL R&D EXPENDITURES (1975)	TOTAL R&D EXPENDITURES				FEDERALLY FINANCED R&D EXPENDITURES			
	1975	1974	1973	1972	1975	1974	1973	1972
UNITED STATES TOTAL	3,393,136	3,017,236	2,939,603	2,676,511	2,283,979	2,032,483	2,038,208	1,838,933
1 UNIV OF WISCONSIN-MADISON	95,436	86,088	84,201	71,673	48,217	47,339	45,783	37,780
2 MASS INST OF TECHNOLOGY	84,668	76,993	125,413	116,306	69,599	62,455	112,652	104,440
3 U OF CAL SAN DIEGO	76,898	67,209	66,789	57,307	69,032	60,904	60,945	52,295
4 UNIVERSITY OF MICHIGAN	74,553	62,880	69,229	67,677	46,671	39,867	45,021	45,427
5 UNIVERSITY OF MINNESOTA	69,655	60,404	53,447	48,388	41,827	35,237	30,800	27,872
6 COLUMBIA UNIV MAIN DIV	68,197	56,465	57,376	51,773	50,852	45,210	46,362	39,975
7 STANFORD UNIVERSITY	66,876	53,950	53,984	51,949	59,640	50,262	50,751	47,118
8 UNIVERSITY OF WASHINGTON	65,947	56,688	53,424	45,091	55,260	49,103	47,205	39,375
9 U OF CAL BERKELEY	65,087	58,294	56,692	[illegible],885	46,648	43,123	42,716	34,995
10 HARVARD UNIVERSITY	64,176	58,207	58,480	[illegible],647	49,667	47,293	47,765	43,144
TOTAL 1ST 10 INSTS.	731,493	637,178	679,035	619,696	537,413	480,793	530,100	472,421
11 CORNELL UNIVERSITY	61,545	56,542	57,453	50,754	36,841	33,269	32,275	30,300
12 UNIVERSITY OF CHICAGO	56,766	52,581	52,181	45,292	45,096	39,126	38,400	34,091
13 U OF CAL LOS ANGELES	57,831	50,016	52,291	44,976	47,326	41,367	44,011	38,067
14 JOHNS HOPKINS UNIVERSITY	56,471	50,924	42,268	38,008	45,787	41,768	35,416	29,870
15 UNIV ILLINOIS URBANA	51,203	48,652	41,810	36,915	32,846	32,454	32,037	24,133
16 U OF CAL SAN FRANCISCO	43,261	33,922	29,109	23,383	36,450	28,118	24,042	19,227
17 UNIV OF TEXAS AT AUSTIN	41,754	36,066	31,386	30,896	23,830	20,266	17,391	21,685
18 YALE UNIVERSITY	41,032	36,576	34,200	35,420	35,255	31,480	29,697	28,810
19 UNIV OF PENNSYLVANIA	41,006	46,421	40,594	38,682	34,762	38,232	31,388	29,555
20 NEW YORK UNIVERSITY	40,976	34,333	37,219	36,766	31,714	25,994	27,081	27,322
TOTAL 1ST 20 INSTS.	1,225,338	1,083,211	1,097,546	1,000,788	907,320	812,867	841,836	755,481
21 U OF CAL DAVIS	40,707	35,214	33,247	26,338	20,573	18,297	17,712	14,336
22 TEXAS A & M UNIVERSITY	39,349	37,209	33,618	30,950	16,180	15,180	15,021	12,428
23 UNIVERSITY OF ROCHESTER	38,848	38,850	38,497	31,008	26,852	28,559	30,135	26,434
24 OHIO STATE UNIVERSITY	38,727	33,590	30,778	28,195	21,116	19,043	19,693	17,839
25 MICHIGAN STATE UNIVERSITY	38,568	32,685	32,534	21,237	24,257	21,253	20,554	16,992
26 UNIVERSITY OF FLORIDA	36,149	30,453	27,254	25,356	14,514	10,118	10,699	9,142
27 PURDUE UNIV ALL CAMPUSES	35,109	30,307	27,315	26,118	20,278	17,830	16,692	14,875
28 UNIVERSITY OF GEORGIA	33,076	30,594	26,310	26,456	10,399	7,547	8,353	8,194
29 UNIVERSITY OF COLORADO	30,825	31,273	34,365	31,435	25,313	23,761	26,774	26,003
30 PENNSYLVANIA STATE UNIV	30,375	32,078	30,286E	28,273	16,105	18,174	17,201E	15,859
TOTAL 1ST 30 INSTS.	1,587,071	1,415,462	1,411,750	1,276,154	1,102,907	992,629	1,024,670	917,583
31 WASHINGTON UNIV ST LOUIS	30,165	25,923	25,286	21,568	27,101	23,497	22,666	18,793
32 UNIV NC AT CHAPEL HILL	30,136	25,380	24,644	17,138	24,825	22,412	19,930	14,318
33 UNIVERSITY OF ARIZONA	29,761	28,103	27,764	21,946	14,902	14,558	14,409	10,692
34 UNIV OF STHRN CALIFORNIA	29,183	24,624	25,155	18,482	24,921	20,916	21,855	16,183
35 YESHIVA UNIVERSITY	28,502	24,595	24,916	26,600E	23,272	20,906	21,571	19,650E
36 UNIVERSITY OF MIAMI	28,101	27,491	26,769	24,050	20,819	18,753	18,237	16,162
37	27,446	24,722	24,103	17,204C	11,503	10,091	9,379	8,284
38 DUKE UNIVERSITY	26,791	21,208	22,261	21,201	23,565	17,621	19,296	19,535
39 IOWA ST U OF SCI & TECH	26,346	22,152	20,298	15,348	7,235	6,295	6,178	5,539
40 RUTGERS THE STATE UNIV	25,638	26,613	21,939	21,768	10,484	9,683	10,208	9,625
TOTAL 1ST 40 INSTS.	1,869,140	1,666,273	1,654,885	1,481,459	1,291,334	1,157,361	1,188,399	1,056,364
41 N C STATE UNIV AT RALEIGH	25,578	23,879	24,856	18,998	9,496	9,016	11,326	7,773
42 UNIVERSITY OF HAWAII	24,596	21,143	24,846	23,520E	15,540	14,065	15,382	13,725E
43 UNIV OF MISSOURI COLUMBIA	24,538	23,205	22,495	33,517	8,796	8,524	7,803	14,675
44 COLORADO STATE UNIVERSITY	24,288	21,096	20,451	20,009	17,902	15,623	15,415	15,284
45 OREGON STATE UNIVERSITY	24,181	21,833	20,241	18,864	13,600	12,559	11,680	10,947
46 UNIVERSITY OF UTAH	22,777	25,450	23,469	20,309	20,504	18,976	18,460	15,989
47 CALIFORNIA INST OF TECH	22,398	19,960	18,653	18,275	19,262	17,751	16,603	16,478
48	21,697	18,395	17,963	18,164C	17,460	14,985	15,154	13,869
49 UNIV OF MD COLLEGE PARK	21,431	18,619	20,365	18,124	13,380	11,396	12,635	11,315
50 UNIVERSITY OF ALASKA	21,139	19,111	16,560	15,524	12,047	10,718	11,822	11,204
TOTAL 1ST 50 INSTS.	2,101,763	1,878,964	1,864,784	1,686,763	1,439,321	1,290,974	1,324,679	1,187,623

SEE FOOTNOTES AT END OF TABLE.

TABLE B-16.
CONTINUED

TOTAL AND FEDERALLY FINANCED R&D EXPENDITURES IN UNIVERSITIES AND COLLEGES, BY INSTITUTION: FISCAL YEARS 1972-75

(DOLLARS IN THOUSANDS)

INSTITUTIONS RANKED BY TOTAL R&D EXPENDITURES (1975)	TOTAL R&D EXPENDITURES				FEDERALLY FINANCED R&D EXPENDITURES			
	1975	1974	1973	1972	1975	1974	1973	1972
51 NORTHWESTERN UNIVERSITY	21,097	17,277	16,261	18,284	15,811	13,105	12,809	11,603
52 UNIVERSITY OF IOWA	20,128	17,178	15,386	14,792	17,553	15,057	13,853	11,902
53 PRINCETON UNIVERSITY	19,737	18,945	18,696	17,211	14,918	13,413	13,742	12,743
54 BAYLOR COLLEGE OF MED	19,643	17,172	15,134	13,056	18,118	15,650	13,235	11,560
55 UNIVERSITY OF CONNECTICUT	18,466	15,502	16,381	15,419E	8,819	7,350	7,618	7,772E
56 VIRGINIA POLYTECHNIC INST	18,089	15,012	13,380	11,564	7,547	5,360	5,189	4,366
57 UNIV OF NEBRASKA - LNCLN	18,084	15,161	13,970	15,907	4,460	3,589	3,990	4,038
58 UNIVERSITY OF PITTSBURGH	17,463	14,098	15,048	15,016	14,742	11,728	13,074	12,788
59 CUNY MT SINAI SCH OF MED	17,234	12,352	11,785	11,828	13,492	8,740	8,055	7,945
60 U OF TEX M D ANDERSON HOS	17,216	14,706	13,264	10,797	10,692	9,255	7,962	6,848
TOTAL 1ST 60 INSTS.	2,288,920	2,036,367	2,014,089	1,830,637	1,565,473	1,394,221	1,424,206	1,279,188
61 WOODS HOLE OCNGRPHIC INST	17,196	14,468	14,342	12,701	14,946	12,992	13,370	11,994
62 GEORGIA INSTITUTE OF TECH	17,109	14,133	12,263	12,016	9,184	6,904	6,111	5,893
63 U OF CAL RIVERSIDE	17,024	15,106	13,960	10,759	6,702	6,257	5,606	4,478
64 WASHINGTON STATE UNIV	16,534	15,177	15,402	16,174	4,100	4,236	4,559	4,478
65 TEMPLE UNIVERSITY	16,461	16,164	11,732	15,244	11,272	10,792	7,190	8,492
66 UNIV ALABAMA BIRMINGHAM	16,324	14,332	11,588	9,867	15,134	13,230	10,729	8,838
67 BOSTON UNIVERSITY	15,944	12,048	9,237	8,012	13,935	10,648	8,407	7,225
68 MISSISSIPPI STATE UNIV	15,824	14,506	11,113	10,423	4,099	4,639	4,216	3,810
69 UNIVERSITY OF CINCINNATI	15,473	14,950	12,142	11,871	8,105	6,845	6,903	6,325
70 CARNEGIE-MELLON UNIV	15,443	14,880	14,850	13,211	9,968	8,736	8,783	8,528
TOTAL 1ST 70 INSTS.	2,452,252	2,182,131	2,140,718	1,950,915	1,662,918	1,479,500	1,500,080	1,349,249
71 UNIV OF KENTUCKY ALL CAM	15,269	2,781	12,594	11,559	7,851	5,745	6,248	6,123
72 VANDERBILT UNIVERSITY	15,171	659	13,683	12,681	13,341	11,817	11,780	10,736
73 OKLAHOMA STATE UNIVERSITY	15,167	13,297	13,416	13,213	6,216	5,301	6,122	5,741
74 UNIVERSITY OF KANSAS	15,142	18,895	17,925	15,765	10,726	14,535	14,141	11,391
75 KANSAS ST UNIVERSITY	14,561	13,352	12,457	11,453	5,611	5,591	5,517	5,462
76 GEORGE WASHINGTON UNIV	14,557	12,577	12,150	10,749	13,011	11,264	10,810	9,108
77 SUNY BUFFALO	14,391	14,648	13,068	10,738	13,485	13,358	8,139	8,270
78 FLORIDA STATE UNIVERSITY	14,320	11,769	11,324	11,324	8,428	8,999	8,695	8,695
79 UNIVERSITY OF VIRGINIA	14,292	13,005	11,027	9,925	10,816	9,437	8,425	7,503
80 LSU CTR AGR SCI/RUR DEV	13,111	11,385	12,197E	0	521	561	462E	0
TOTAL 1ST 80 INSTS.	2,598,233	2,317,499	2,270,559	2,058,322	1,752,924	1,566,108	1,580,419	1,422,278
81 AUBURN UNIVERSITY	12,049	10,424	9,464	8,912	4,230	3,821	4,078	3,574
82 TULANE UNIVERSITY	12,028	11,315	12,392	10,333E	7,734	7,276	7,983	5,992E
83 UNIV OF MASS AT AMHERST	11,990	14,197	9,180	7,752	7,398	7,852	6,719	5,312
84 UNIVERSITY OF IDAHO	11,622	10,021	8,572	7,881	4,842	4,306	3,759	3,530
85 SUNY UPSTATE MEDICAL CTR	11,591	9,264	9,486	6,907	7,610	6,051	6,720	5,509
86 UTAH STATE UNIVERSITY	11,591	11,529	9,837	9,243	8,375	7,921	7,594	6,361
87 CLEMSON UNIVERSITY	11,364	8,288	6,744	5,992	2,932	2,572	2,260	2,360
88 U OF CAL IRVINE	11,329	8,619	6,776	5,029	9,987	7,427	5,949	4,376
89 EMORY UNIVERSITY	11,046	8,844	8,232	7,739	9,694	7,514	7,141	6,817
90 GEORGETOWN UNIVERSITY	10,944	8,876	7,771	5,465E	5,448	4,792	5,026	4,674
TOTAL 1ST 90 INSTS.	2,713,787	2,418,876	2,359,013	2,133,575	1,821,174	1,625,640	1,637,648	1,470,783
91 UNIV OF VT & ST AGRIC COL	10,527	7,786	7,188	6,384	7,240	5,127	4,761	4,696
92 INDIANA UNIV-BLOOMINGTON	10,289	8,678	9,214	9,258	8,896	7,200	7,744	7,799
93 U PUERTO RICO MAYAGUEZ	10,049	9,425	8,482E	7,634E	3,190	3,147	2,832E	2,549E
94 SUNY STONY BROOK	10,000	8,910	8,540	7,142	8,682	7,324	6,837	6,252
95 NEW MEXICO STATE UNIV	9,966	7,986	6,849	12,899	8,746	7,249	6,257	12,437
96 UNIVERSITY OF ARKANSAS	9,926	8,422	7,638	9,192	2,773	2,306	2,811	4,312
97 UNIV OF MD BALTIMORE	9,892	7,981	6,812	6,270	8,445	6,724	5,695	5,747
98 ST LOUIS UNIV	9,269	5,704	5,548	5,725	8,235	4,943	4,771	4,721
99 U TEX GALVESTON MED BRAN	9,099	7,649	6,534	5,345	5,841	4,430	4,224	3,705
100 BROWN UNIVERSITY	8,975	8,345	8,894	12,736	8,143	7,779	8,344	8,875
TOTAL 1ST 100 INSTS.	2,811,779	2,499,762	2,434,712	2,216,160	1,891,365	1,681,869	1,691,924	1,531,876

SEE FOOTNOTES AT END OF TABLE.

TABLE B-16.
CONTINUED

TOTAL AND FEDERALLY FINANCED R&D EXPENDITURES IN UNIVERSITIES AND COLLEGES, BY INSTITUTION: FISCAL YEARS 1972-75

(DOLLARS IN THOUSANDS)

INSTITUTIONS RANKED BY TOTAL R&D EXPENDITURES (1975)	TOTAL R&D EXPENDITURES				FEDERALLY FINANCED R&D EXPENDITURES			
	1975	1974	1973	1972	1975	1974	1973	1972
101 SUNY DOWNSTATE MED CTR	8,885	7,535	5,568	4,960	7,336	6,001	4,126	3,709
102 UNIVERSITY OF NEW MEXICO	8,844	7,095	7,093	5,537	7,223	5,632	5,093	4,398
103 WAYNE STATE UNIVERSITY	8,811	7,168	6,386	4,805	5,457	4,450	3,741	3,148
104 INDIANA UNIVERSITY-PURDUE	8,748	8,168	7,965	7,396	6,102	5,665	5,714	4,783
105 UNIV OF MAINE ORONO	8,489	6,824E	6,438	5,769	3,968	4,436E	4,307	3,118
106 U TEX HLTH SCI CTR DALLAS	8,436	6,969	6,258	5,484	6,898	5,349	4,941	4,379
107 UNIVERSITY OF DENVER	7,880	7,604	6,611	6,323	6,329	5,425	5,437	5,223
108 UNIVERSITY OF WYOMING	7,728	7,157	6,678	5,660	5,069	4,626	4,531	3,510
109 UNIVERSITY OF OREGON	7,690	7,276	6,697	5,778	7,506	6,975	6,361	5,003
110 MONTANA STATE UNIVERSITY	7,622	6,130	6,692	4,963	3,060	2,314	2,450	2,220
TOTAL 1ST 110 INSTS.	2,894,912	2,571,688	2,501,098	2,272,835	1,950,313	1,732,742	1,738,625	1,571,367
111 U TENN MED UNITS MEMPHIS	7,444	6,142	7,081	4,970	6,244	5,198	6,001	4,174
112 WEST VIRGINIA UNIVERSITY	7,418	6,820	6,851	8,721E	5,469	4,225	4,736	6,123E
113 VIRGINIA COMMONWLTH UNIV	7,315	6,871	6,850	5,718	5,436	5,152	5,282	4,082
114 TUFTS UNIVERSITY	7,126	7,647	7,436	7,489	6,016	6,280	6,393	6,475
115 BRANDEIS UNIVERSITY	7,033	6,747	6,601	6,443E	6,438	6,057	5,814	5,658E
116 UNIVERSITY OF DAYTON	7,024	6,333	6,395	5,623	6,548	6,080	6,067	5,281
117 ALBANY MED COL OF UNION U	6,939	5,980	6,598	5,831	4,015	3,139	3,127	2,626
118 THOM JEFFERSON UNIV HOSP	6,915	5,460	4,847	3,881	5,419	4,215	3,873	2,826
119 NORTH DAKOTA STATE UNIV	6,856	5,602	5,263	4,728	1,665	1,514	1,480	1,341
120 UNIVERSITY OF DELAWARE	6,783	6,333	5,760	4,984	3,689	3,566	3,500	3,158
TOTAL 1ST 120 INSTS.	2,965,767	2,635,623	2,564,780	2,331,223	2,001,252	1,778,168	1,784,898	1,613,111
121 U TENN INST OF AGRICULT	6,748	4,788	4,407	4,109	2,279	2,078	2,018	1,924
122 LA ST U BATON ROUGE	6,740	6,554	4,371	15,399	3,222	3,024	2,010E	5,083
123 UNIV OF RHODE ISLAND	6,738	5,187	4,940E	4,705E	5,460	4,166	3,968E	3,779E
124 SYRACUSE UNIVERSITY	6,659	6,020	11,988	7,250E	5,780	5,017	10,233	6,000E
125 RICE UNIVERSITY	6,591	6,297	5,927	5,637	5,499	5,122	4,971	4,878
126 U TEX MED SCH HOUSTON	6,249	4,625	3,812	386	5,243	3,909	2,884	381
127 U OF ILL MEDICAL CENTER	6,216	6,224	6,554	6,857	3,747	3,999	4,330	4,373
128 UNIV OF MISSISSIPPI	6,124	6,073	6,278	5,010E	3,706	3,608	3,865	3,344E
129 NEW YORK MEDICAL COLLEGE	6,056	5,473	4,615	4,695	4,757	4,274	3,550	3,032
130 U TENNESSEE KNOXVILLE	6,042	4,898	4,067	3,279	5,326	4,232	3,555	2,621
TOTAL 1ST 130 INSTS.	3,029,930	2,691,762	2,621,739	2,388,550	2,046,271	1,817,597	1,826,282	1,648,526
131 THE MED COLL OF WISCONSIN	5,924	5,386	5,066	3,862	4,006	3,432	3,372	2,275
132 DARTMOUTH COLLEGE	5,690	3,726	4,918	4,565	5,105	3,371	4,501	4,046
133 U OF NEB MED C AT OHAMA	5,665	4,617	5,706E	3,369	3,593	3,338	2,984E	2,713
134 MEDICAL COLL OF GEORGIA	5,664	5,036	3,924	2,672	2,764	2,449	2,762	1,570
135 COL OF MED & DENT OF N J	5,659	4,528	3,457	2,295	4,385	3,294	2,902	1,769
136 RENSSELAER POLY INST	5,638	5,030E	5,382E	4,893	4,672	4,482E	4,796E	4,360
137 U OF OREGON MED SCHOOL	5,508	5,753	6,036E	5,487	4,289	4,707	4,571E	4,155
138 U OF CAL SANTA BARBARA	5,452	4,770	4,939	4,578	4,565	3,857	4,146	4,010
139 UNIV OKLAHOMA	5,387	4,991	5,937E	5,476E	4,687	4,209	4,797E	4,505E
140 TEXAS TECH UNIVERSITY	5,127	4,084	4,037	4,093	1,514	935	938	877
TOTAL 1ST 140 INSTS.	3,085,644	2,739,483	2,669,141	2,429,842	2,085,857	1,851,671	1,862,051	1,678,806
141 LEHIGH UNIVERSITY	5,054	4,823	4,654	5,610	3,235	3,179	3,274	3,567
142 UNIVERSITY OF NOTRE DAME	5,018	5,011	4,527	4,373	4,378	4,428	4,096	4,053
143 UNIVERSITY OF HOUSTON	4,782	3,387	3,044	2,156	4,107	2,728	2,436	1,714
144 UNIVERSITY OF LOUISVILLE	4,778	3,324	2,751	2,369	2,627	2,280	1,887	1,802
145 SOUTH DAKOTA STATE UNIV	4,771	4,527	4,472	4,570	1,645	1,607	1,596	1,729
146 U TEX HLTH SCI CR SAN ANT	4,593	3,494	3,285	1,530	3,658	2,753	2,599	1,080
147 UNIV OF MISSOURI ROLLA	4,389	4,649	4,059	4,565	2,076	2,255	2,200	2,593
148 UNIV OF NEW HAMPSHIRE	4,373	3,547	3,856	3,094	2,594	2,487	2,846	2,602
149 U OF WIS MILWAUKEE	4,369	3,760	3,665	3,187	1,581	1,190	1,149	1,036
150 S U N Y SYSTEM OFFICE	4,278I	3,786E	3,572	3,215E	3,272I	2,896E	2,812	2,240E
TOTAL 1ST 150 INSTS.	3,132,049	2,779,791	2,707,026	2,464,511	2,115,030	1,877,474	1,886,946	1,701,222

SEE FOOTNOTES AT END OF TABLE.

TABLE B-16.
CONTINUED

TOTAL AND FEDERALLY FINANCED R&D EXPENDITURES IN UNIVERSITIES AND COLLEGES, BY INSTITUTION: FISCAL YEARS 1972-75

(DOLLARS IN THOUSANDS)

INSTITUTIONS RANKED BY TOTAL R&D EXPENDITURES (1975)	TOTAL R&D EXPENDITURES 1975	1974	1973	1972	FEDERALLY FINANCED R&D EXPENDITURES 1975	1974	1973	1972
151 MICHIGAN TECH UNIVERSITY	4,128	3,244	2,207	1,948	1,098	925	460	393
152 INDIANA UNIV NORTHWEST	4,104	4,847	5,082	3,375	3,996	4,845	5,077	3,282
153 RUSH MEDICAL COLLEGE	4,097	4,759	4,485	3,785E	3,149	3,762	2,792	2,062E
154 LA ST U MED CTR N ORLEANS	4,086	3,532	3,231	2,447	3,298	2,580	2,060	1,739
155 SUNY ALBANY	4,001	3,497	3,686	5,165	2,900	2,767	2,935	3,673
156 UNIV OF SOUTH FLORIDA	3,927	2,108	1,956	1,178	1,300	1,084	1,087	787
157 BOSTON COLLEGE	3,872	3,280	4,182E	3,802	2,578	1,967	2,552E	2,320
158	3,765	3,093	3,255E	3,058C	3,069	2,453	2,638E	3,151C
159 UNIV OF NEVADA - RENO	3,764	4,114	3,049	1,952	1,333	1,373	1,239	1,242
160 U OF CAL SANTA CRUZ	3,605	3,015	2,769	2,711	2,262	1,671	1,715	1,911
TOTAL 1ST 160 INSTS.	3,171,398	2,815,280	2,740,928	2,494,532	2,140,013	1,901,101	1,909,501	1,721,782
161 POLYTECHNIC INST OF N Y	3,501	3,761	3,239	2,845	3,337	3,453	3,014	2,582
162 UNIV OF MO SYSTEM OFC	3,497	4,758	4,706	6,900	365	1,872	2,368	2,903
163 U OF NEV DESERT RES INST	3,423	3,710	3,239	4,000E	1,397	1,562	2,216	2,000E
164 MED UNIV OF SO CAROLINA	3,358	2,948	2,305	2,084	2,846	2,346	1,739	1,645
165 ARIZONA STATE UNIVERSITY	3,333	2,617	2,242	1,919	2,342	1,395	1,345	1,224
166 UNIV OF ILL CHICAGO CIR	3,306	2,021	1,775	1,504	2,649	1,828	1,380	1,260
167 UNIV OF NORTH DAKOTA	3,255	1,890	1,400	1,126	2,708	1,580	1,023	750
168 UNIV OF SOUTH ALABAMA	3,195	1,761	985	530	2,485	1,239	774	506
169 STEVENS INSTITUTE OF TECH	3,158	3,472	3,498	3,424	2,080	2,113	2,220	2,218
170 CITY COLLEGE OF NEW YORK	3,158	1,943I	1,823E	1,666E	2,309	1,426I	1,384E	1,247E
TOTAL 1ST 170 INSTS.	3,204,582	2,843,661	2,766,150	2,520,590	2,162,531	1,919,915	1,926,962	1,738,117
171 BRIGHAM YOUNG UNIVERSITY	3,132	2,656	2,698E	2,453	1,477	1,599	1,366E	1,244
172 UNIV OF SOUTH CAROLINA	3,111	2,245	1,841	1,657E	1,555	982	792	713E
173 US NAVAL POSTGRAD SCHOOL	3,095	2,601	2,925	1,934	3,095	2,601	2,925	1,934
174 HOWARD UNIVERSITY	3,069	4,216	3,680E	3,672E	2,612	3,680	2,863E	2,857E
175 SAN DIEGO STATE UNIV	2,956	2,966	2,842	2,522	2,292	2,377	2,272	2,025
176 CATHOLIC UNIV OF AMERICA	2,930	2,462	2,488	2,393	2,331	2,092	2,155	2,040
177 ALABAMA A & M UNIV	2,821	896	694E	442E	1,900	640	512E	290E
178	2,733	2,846	2,836C	2,474C	2,067	2,362	2,381	2,149C
179 UNIVERSITY OF MONTANA	2,727	3,040	2,764E	1,497	1,680	1,709	1,554E	720
180 U OF CAL UNIV-WIDE PRGMS	2,651	2,139	1,991	1,716	106	72	50	35
TOTAL 1ST 180 INSTS.	3,233,807	2,869,728	2,790,909	2,541,390	2,181,646	1,938,029	1,943,814	1,752,124
181 CUNY GRADUATE DIVISION	2,619	2,301	1,567	815E	2,124	1,480	991	550E
182 SUNY COL OF ENV SCI & FOR	2,502	2,362	2,808	2,290	891	880	869	671
183 DREXEL UNIVERSITY	2,443	2,466	2,358E	1,609E	1,660	1,638	1,904E	1,471E
184 AMERICAN UNIVERSITY THE	2,408	2,105	2,143	2,128	2,364	2,059	2,112	2,057
185 N MEX INST MINING & TECH	2,321	2,695	2,534	2,287	1,615	1,618	1,460E	1,338
186 U OF ARKANSAS MED CENTER	2,318	2,258	2,249	2,031	1,812	1,654	1,766	1,802
187 HAHNEMAN MEDICAL COLLEGE	2,166	2,902	3,111	3,330	1,256	2,257	2,517	2,113
188 SOUTHERN ILLINOIS UNIV	2,156	2,439	2,754	3,246	693	654	580	642
189 U PUERTO RICO MED SCI CMP	2,115	1,963	1,767E	1,590E	2,107	1,579	1,419E	1,277E
190 THE MED COLL OF PENNA	2,105	1,611	1,313	992	1,722	1,066	1,081	758
TOTAL 1ST 190 INSTS.	3,256,960	2,892,830	2,813,513	2,561,788	2,197,890	1,952,916	1,958,563	1,764,803
191 LOYOLA UNIVERSITY	2,025	1,625	1,436	1,399	1,769	1,433	1,175	1,142
192 WORCESTER POLY INSTITUTE	1,964	1,488	1,686	1,768	402	414	467	557
193 COLORADO SCHOOL OF MINES	1,922	1,259	1,380	834	1,653	1,102	1,366	816
194 NC AG & TECH STATE UNIV	1,830	1,419	1,618E	785	1,685	1,335	1,068	613
195 INSTITUTE PAPER CHEMISTRY	1,822	2,045	1,970	2,081	132	169	93	121
196 SOUTHERN METHODIST UNIV	1,780	1,530	1,910	1,328	1,130	1,064	1,518	1,044
197 VIRGINIA STATE COLLEGE	1,776	869	272	103	1,776	869	262	97
198 ILLINOIS INST OF TECH	1,764	2,277	2,834	3,072	1,524	2,038	2,571	2,831
199 LOMA LINDA UNIVERSITY	1,751	1,177	1,044	815E	1,334	801	638	468E
200 SUNY BINGHAMTON	1,712	1,189	806E	733E	1,208	863	646E	582E
TOTAL 1ST 200 INSTS.	3,275,306	2,907,708	2,828,469	2,574,706	2,210,503	1,963,004	1,968,367	1,773,674
TOTAL ALL OTHER INSTS.	117,830	109,528	111,134	101,805	73,476	69,479	69,841	65,859

NOTE: NUMBERS FOLLOWED BY THE LETTER "E" ARE ESTIMATES; THOSE FOLLOWED BY "I" ARE IMPUTATIONS; AND THOSE FOLLOWED BY "C" ARE CONFIDENTIAL.

SOURCE: NATIONAL SCIENCE FOUNDATION.

TABLE B-41.

TOTAL AND FEDERALLY FINANCED CAPITAL EXPENDITURES FOR SCIENTIFIC AND ENGINEERING FACILITIES AND EQUIPMENT FOR RESEARCH, DEVELOPMENT, AND INSTRUCTION, BY FIELD OF SCIENCE FOR SELECTED FISCAL YEARS: 1964-75

(DOLLARS IN THOUSANDS)

FIELD	1964	1966	1968	1970	1972	1973	1974	1975
TOTAL	529,492	666,997	1,070,727	951,873	914,844	840,461	837,420	1,018,431
ENGINEERING	71,699	95,119	126,304	132,623	87,307	57,955	90,715	118,461
PHYSICAL SCIENCES	130,700	182,678	283,811	225,268	68,223	108,868	89,483	81,171
ENVIRONMENTAL SCIENCES	(1)	(1)	(1)	(1)	96,295	26,624	24,022	35,208
MATHEMATICAL SCIENCES	22,792	31,856	55,104	38,160	24,712	20,016	23,708	25,962
LIFE SCIENCES	231,993	276,328	452,707	418,472	517,941	488,680	494,898	658,534
PSYCHOLOGY	21,720	19,734	34,425	22,036	19,007	39,566	15,606	11,530
SOCIAL SCIENCES	32,588	44,928	76,217	62,049	59,993	61,217	59,478	50,008
OTHER SCIENCES, NEC	18,000	16,354	42,159	53,265	41,366	37,535	39,510	37,557
FEDERALLY FINANCED								
TOTAL	134,439	212,397	340,447	279,316	239,193	226,743	227,780	270,275
ENGINEERING	10,946	25,049	39,432	38,263	23,439	15,751	42,283	64,092
PHYSICAL SCIENCES	29,701	67,300	95,178	63,107	18,551	24,473	20,913	19,072
ENVIRONMENTAL SCIENCES	(1)	(1)	(1)	(1)	17,827	5,873	7,023	5,880
MATHEMATICAL SCIENCES	4,052	11,469	13,676	9,536	4,341	3,022	4,291	5,161
LIFE SCEINCES	81,659	90,173	150,591	142,718	152,328	161,934	140,821	166,859
PSYCHOLOGY	2,121	4,310	10,342	4,848	3,663	5,101	2,596	2,249
SOCIAL SCIENCES	2,020	7,892	17,627	10,303	10,939	5,371	4,614	2,790
OTHER SCIENCES, NEC	3,940	6,204	13,601	10,541	8,105	5,218	5,239	4,172
OTHER SOURCES								
TOTAL	395,053	454,600	730,280	672,557	675,651	613,718	609,640	748,156
ENGINEERING	60,753	70,070	86,872	94,360	63,868	42,204	48,432	54,369
PHYSICAL SCIENCES	110,999	115,378	188,633	162,161	49,672	84,395	68,570	62,099
ENVIRONMENTAL	(1)	(1)	(1)	(1)	78,468	20,751	16,999	29,328
MATHEMATICAL SCIENCES	18,740	20,387	41,428	28,624	20,371	16,994	19,417	20,801
LIFE SCIENCES	150,334	186,155	302,116	275,754	365,613	326,746	354,077	491,675
PSYCHOLOGY	19,599	15,424	24,083	17,188	15,344	34,465	13,010	9,281
SOCIAL SCIENCES	30,568	37,036	58,590	51,746	49,054	55,846	54,864	47,218
OTHER SCIENCES, NEC	14,060	10,150	28,558	42,724	33,261	32,317	34,271	33,385

1 Not separately available, included in Physical sciences.

SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE B-47.

R&D EXPENDITURES IN UNIVERSITY-ADMINISTERED FEDERALLY FUNDED RESEARCH AND DEVELOPMENT CENTERS, BY CHARACTER OF WORK, AND FIELD OF SCIENCE FOR SELECTED FISCAL YEARS: 1964-75

(DOLLARS IN THOUSANDS)

CHARACTER AND FIELD	1964	1966	1968	1970	1972	1973	1974	1975
TOTAL	629,207	629,502	718,930	736,847	763,563	816,923	865,098	986,736
CHARACTER OF WORK:								
BASIC RESEARCH	191,027	226,547	275,595	268,732	250,167	296,492	299,813	307,474
APPLIED RESEARCH	201,800	207,012	231,207	215,587	225,452	226,376	267,145	346,567
DEVELOPMENT	236,380	195,943	212,128	252,528	287,944	294,055	298,140	332,695
FIELD OF SCIENCE:								
ENGINEERING(TOTAL)	154,704	150,522	178,945	189,060	198,070	251,539	260,958	278,116
PHYSICAL SCIENCES(TOTAL)	362,352	368,485	410,362	428,189	431,864	425,107	456,647	533,101
ASTRONOMY	24,599	20,114	27,330	19,765	28,473	28,055	29,944	31,153
CHEMISTRY	59,458	51,941	61,718	71,229	75,395	73,114	77,742	84,862
PHYSICS	264,632	285,306	306,294	317,549	309,266	318,002	345,401	406,086
OTHER PHYSICAL SCIENCES, NEC	13,633	11,124	15,020	19,646	18,730	5,936	3,560	11,000
ENVIRONMENTAL SCIENCES(TOTAL)	28,310	31,173	27,875	26,970	37,186	40,647	44,069	56,958
MATHEMATICAL SCIENCES(TOTAL)	39,850	40,019	37,147	38,213	41,738	53,178	53,517	61,595
MATHEMATICS (EXCLUDING COMPUTER SCIENCES)	NA	NA	NA	NA	NA	14,744	16,002	17,659
COMPUTER SCIENCES	NA	NA	NA	NA	NA	38,434	37,515	43,936
LIFE SCIENCES(TOTAL)	37,504	32,136	32,602	34,176	36,346	33,964	36,296	43,531
BIOLOGICAL (INCLUDES AGRICULTURAL SCIENCES)	28,528	25,150	26,352	26,804	29,204	24,379	27,245	32,908
MEDICAL SCIENCES	8,976	6,986	5,634	6,753	3,707	3,312	4,291	4,963
OTHER LIFE SCIENCES, NEC	NA	NA	616	619	3,435	6,273	4,760	5,660
PSYCHOLOGY(TOTAL)	4,776	4,195	5,661	1,506	1,447	898	850	306
SOCIAL SCIENCES(TOTAL)	1,522	2,815	8,945	5,059	8,686	169	330	795
ECONOMICS	NA	NA	149	20	NA	0	14	795
POLITICAL SCIENCE	NA	NA	336	220	91	0	0	0
SOCIOLOGY	NA	NA	604	102	55	169	316	0
OTHER SOCIAL SCIENCES, NEC	1,522	2,815	7,856	4,717	8,540	0	0	0
OTHER SCIENCES, NEC. (TOTAL)	189	157	17,393	13,674	8,226	11,421	12,431	12,334

NOTE: NA - not available.

SOURCE: NATIONAL SCIENCE FOUNDATION

APPENDIX C

Reproduction of Covering Letter and Survey Forms

NATIONAL SCIENCE FOUNDATION
WASHINGTON, D.C. 20550
October 24, 1975

Dear Respondent:

The National Science Foundation requests your cooperation in its tenth survey of scientific and engineering expenditures at universities and colleges. Early responses are critical to the success of the survey. Timely statistics play a vital part in assessing the overall effectiveness of ongoing Federal R&D efforts to strengthen science and technology in universities and colleges. Your reports will be processed immediately to include the data in (a) the National Science Board's annual report to the President, (b) NSF's Science Resources Studies Highlights, and (c) NSF's report National Patterns of R&D Resources.

There is one significant addition to this year's survey. Item 2 requests data on basic research expenditures by field of science because of the great need for this data by the National Science Board for its next edition of Science Indicators, a biennial report to the President and Congress. Ordinarily, as a matter of policy, NSF informs respondents well in advance about survey revisions and, for that reason, we have labeled the new addition to Item 2 as "optional." NSF plans to add the data items on basic research by field of science as a permanent part of the 1976 survey.

The postcard included in the package should be returned immediately to assure us that the questionnaire has reached you; also, it will provide the names of persons to be contacted if questions arise in the follow-up and editing phases of the survey.

NSF recognizes that your breakdown of expenditures into basic research, applied research, development, and departmental research requires estimates from "soft" data. NSF will publish only national aggregates for these statistics; therefore, your best estimate is perfectly satisfactory. We are also enclosing a "Departmental Worksheet" which may be used at your discretion to obtain estimates from departmental chairpersons in your institution. If you need additional copies of the worksheet, please let us know.

A copy of a published summary of last year's data has already been sent to you as part of NSF's efforts to provide early release of statistics. A detailed report will be published shortly. If you would like to have any additional data from the survey listings, such as institutional rankings, please let us know and we will try to provide them to you.

Your continued cooperation in reporting timely data to NSF is greatly appreciated. If you have questions, please address them to me or Mr. James Hoehn. We may be reached on Area Code 202, 282-7790.

Sincerely yours,

Richard M. Berry

Richard M. Berry, Study Director
Universities and Nonprofit
Institutions Studies Group
Division of Science Resources Studies

Enclosures

APPENDIX C.

NSF FORM 411 (Oct. 1975)

FORM APPROVED
OMB No. 99-R0279

REPRODUCTION OF SURVEY FORM
NATIONAL SCIENCE FOUNDATION
Washington, D.C. 20550

SURVEY OF SCIENTIFIC AND ENGINEERING
EXPENDITURES AT UNIVERSITIES AND COLLEGES, FY 1975
(Current and Capital Expenditures for Research,
Development, and Instruction in the Sciences and Engineering)

Organizations are requested to complete and return this form to:

NATIONAL SCIENCE FOUNDATION
1800 G Street, N.W.
Washington, D.C. 20550
Attn: UNISG

This form should be returned by November 30, 1975. Your cooperation in returning the survey questionnaire promptly is very important.

Financial data are requested for your institution's 1975 fiscal year.

All financial data requested on this form should be reported in thousands of dollars; for example, an expenditure of $25,342 should be rounded to the nearest thousand dollars and reported as $25.

Where exact data are not available, estimates are acceptable.

Please correct if name or address has changed

(Includes aggregate data from 540 universities and colleges but excludes 22 university-administered FFRDC'S)

Include data for branches and all organizational units of your institution, such as medical schools and agricultural experiment stations. Also include hospitals or clinics owned, operated, or controlled by universities, and integrated operationally with the clinical programs of your medical schools. Exclude data for Federally Funded Research and Development Centers (FFRDC's). A separate questionnaire is included in this package if your institution administers an FFRDC. If you have any questions, please contact Jim Hoehn (202-282-7790).

Please note in space below:
(1) Any suggestions to improve the design of the survey questionnaire; (2) any suggestions to improve the instructions.

(Attach additional sheets, if necessary.)

NAME OF PERSON WHO PREPARED THIS SUBMISSION

TELEPHONE
AREA | EXCHANGE | NUMBER | EXTENSION

TITLE

DATE

Please check and correct if necessary the name and address of your institution shown on the mailing label.

ITEM 1. CURRENT EXPENDITURES FOR SEPARATELY BUDGETED RESEARCH AND DEVELOPMENT (R&D) IN THE SCIENCES AND ENGINEERING, BY SOURCE OF FUNDS AND TYPE OF ACTIVITY, FY 1975 (Include indirect costs)

ITEM 1. INSTRUCTIONS

Separately budgeted research and development includes all funds expended for activities specifically organized to produce research outcomes and commissioned by an agency either external to the institution or separately budgeted by an organizational unit within the institution. Include expenditures from both the unrestricted and restricted current fund account. Exclude training grants, public service grants, demonstration projects, etc.

Include in lines a through f only restricted funds. Restricted funds include those monies which were restricted by the sponsor as to the specific operating purpose for which they could be expended. The determination of restricted or unrestricted (institutional) funds reflects the ability of your institution to change the purpose for which the funds are expended without further authorization from the source of the monies. The restricted funds category of Federal, State, or local governments includes all R&D expenditures from funds received through appropriations, grants, or contracts from these sources and restricted by them as to use. The funding source is determined by the organization (e.g., State government, foundation, etc.) that designates the money for research and development even if your organization determines which projects are to be funded. Include reimbursed indirect costs.

Include in line g any funds your institution was free to designate for R&D. The sources of these funds may include: (a) unrestricted or general purpose State or local government appropriations, (b) general purpose grants from industry, foundations, or other outside sources, (c) tuition and fees, (d) endowment income, (e) unreimbursable indirect costs associated with R&D financed by outside organizations.

Source of funds		(1) Total R&D expenditures (Thousands of dollars)	(2) Basic research (Percent of column one)	(3) Applied research (Percent of column one)	(4) Development (Percent of column one)
a. Federal Government	1110	$ 2,283,979	74.0 %	22.6 %	3.4 %
b. State government	1120	336,445			
c. Local government	1130	15,428			
d. Private foundations and voluntary health agencies	1140	165,587			
e. Industry	1150	111,560			
f. All other outside sources	1160	90,178			
g. Institutional funds	1170	389,959			
h. Total (sum of a through g)	1100	$ 3,393,136	70.6 %	25.1 %	4.3 %

Basic research is directed toward an increase of knowledge; it is research where the primary aim of the *investigator* is a fuller knowledge or understanding of the subject under study rather than a practical application thereof.

Applied research is directed toward the practical application of knowledge. The definition of applied research differs from basic research chiefly in terms of the objectives of the *investigator*.

Development is the systematic use of knowledge directed toward the design and production of useful prototypes, materials, devices, systems, methods, or processes. It does *not* include quality control or routine product testing.

ITEM 2. (next page) INSTRUCTIONS

Total and federally financed basic research (Columns 3 and 4) by field of science are optional. This information is needed by NSF and others interested in the health of basic research. If you are unable to provide this information for FY 1975, please indicate its feasibility for FY 1976.

Yes _____ No _____

If "no", please explain _____

Enclosed is a departmental data worksheet which may be useful in collecting basic research and departmental research from department chairpersons. NSF will provide as many data worksheets as needed.

ITEM 2. TOTAL AND FEDERALLY FINANCED EXPENDITURES FOR SEPARATELY BUDGETED RESEARCH AND DEVELOPMENT, BY FIELD OF SCIENCE, FY 1975

Field of science	Illustrative disciplines		Thousands of dollars: Total	Thousands of dollars: Federal
a. ENGINEERING	Aeronautical, agricultural, chemical, civil, electrical, industrial, mechanical, metallurgical, mining, nuclear, petroleum, bio-and-biomedical, energy, textile, architecture	1410	$ 380,522	$ 259,524
b. PHYSICAL SCIENCES (TOTAL)		1420	350,340	284,664
(1) Astronomy	Astrophysics, optical and radio, x-ray, gamma-ray, neutrino	1421	26,610	19,574
(2) Chemistry	Inorganic, organo-metallic, organic, physical, analytical, pharmaceutical, polymer science (exclude biochemistry)	1422	121,337	92,721
(3) Physics	Acoustics, atomic and molecular, condensed matter, elementary particles, nuclear structure, optics, plasma	1423	173,290	149,879
(4) Other	Used for multidisciplinary projects within physical sciences and for disciplines not requested separately	1424	29,103	22,540
c. ENVIRONMENTAL SCIENCES	ATMOSPHERIC SCIENCES: Aeronomy, solar weather modification, meteorology, extra-terrestrial atmospheres GEOLOGICAL SCIENCES: Engineering geophysics, geology, geodesy, geomagnetism, hydrology, geochemistry, paleomagnetism, paleontology, physical geography, cartography, seismology, soil sciences OCEANOGRAPHY: Chemical, geological, physical, marine geophysics, marine biology, biological oceanography	1430	255,033	180,566
d. MATHEMATICAL SCIENCES (TOTAL)		1440	84,931	64,868
(1) Mathematics	Algebra, analysis, applied mathematics, foundations and logic, geometry, numerical analysis, statistics, topology	1441	39,609	31,120
(2) Computer sciences	Design, development, and application of computer capabilities to data storage and manipulation, information science	1442	45,322	33,748
e. LIFE SCIENCES (TOTAL)		1450	1,895,008	1,237,497
(1) Biological sciences	Anatomy, biochemistry, biophysics, biogeography, ecology, embryology, entomology, genetics, immunology, microbiology, nutrition, parasitology, pathology, pharmacology, physical anthropology, physiology, botony, zoology	1451	604,251	432,265
(2) Agricultural	Agricultural chemistry, agronomy, animal science, conservation, dairy science, plant science, range science, wildlife	1452	381,953	112,175
(3) Medical	Anesthesiology, cardiology, endocrinology, gastroenterology, hematology, neurology, obstetrics, ophthamology, preventive medicine and community health, psychiatry, radiology, surgery, veterinary medicine, dentistry, pharmacy	1453	837,130	641,507
(4) Other	Used for multidisciplinery projects within life sciences	1454	71,674	51,550
f. PSYCHOLOGY	Animal behavior, clinical, educational, experimental, human development and personality, social	1460	79,880	61,193
g. SOCIAL SCIENCES (TOTAL)		1470	249,929	139,785
(1) Economics	Econometrics, international, industrial, labor, agricultural, public finance and fiscal policy	1471	56,112	27,081
(2) Political science	Regional studies, comparative government, international relations, legal systems, political theory, public administration	1472	28,694	11,953
(3) Sociology	Comparative and historical, complex organizations, culture and social structure, demography, group interactions, social problems and welfare, theory	1473	68,713	45,083
(4) Other	History of science, cultural anthropology, linguistics, socio-economic geography, research in education	1474	96,410	55,668
h. OTHER SCIENCES	To be used when the multidisciplinary and interdisciplinary aspects make the classification under one primary field impossible; do *not* include nonscience activities such as English or music in this survey	1480	97,493	55,882
i. TOTAL (SUM of a through h) Check to insure that column totals are identical with data reported in item 1.		1400	3,393,136	2,283,979

ITEM 3. CURRENT EXPENDITURES FOR INSTRUCTION AND DEPARTMENTAL RESEARCH IN GRADUATE DEGREE GRANTING INSTITUTIONS IN THE SCIENCES AND ENGINEERING, BY FIELD OF SCIENCE, FY 1975 (Direct expenditures only)

OMIT ITEM 3 IF YOUR INSTITUTION DOES NOT GRANT A DOCTORATE OR MASTER'S DEGREE IN THE SCIENCES OR ENGINEERING.

ITEM 3. INSTRUCTIONS

Include the salaries of department heads, faculty members, secretaries and technicians; office and laboratory supplies; and expenditures for degree credit instructional programs in science and engineering subjects. The time spent in supervising the thesis work of graduate students should be reported as an expenditure for instruction, not for departmental research. Departmental research (no sponsored research) is "personal" or "faculty" research supported by General Funds of the department as a specifically assigned, departmentally planned, or mutually understood part of the faculty member's total activity.

Field of science		Total instruction and departmental research (Thousands of dollars) (1)	Departmental research as a percent of col. 1 (No decimals) (2)
a. Engineering	1510	$ 451,124	11.0 %
b. Physical sciences	1520	436,262	12.2 %
c. Environmental sciences	1530	121,749	12.0 %
d. Mathematical sciences	1540	295,457	10.9 %
e. Life sciences	1550	1,755,022	12.7 %
f. Psychology	1560	205,259	10.3 %
g. Social sciences	1570	898,825	10.6 %
h. Other sciences, NEC	1580	192,683	10.0 %
i. Total (sum of a through h)	1600	$ 4,356,381	11.6 %

ITEM 4. CAPITAL EXPENDITURES FOR SCIENTIFIC AND ENGINEERING FACILITIES AND EQUIPMENT FOR RESEARCH, DEVELOPMENT, AND INSTRUCTION, BY FIELD OF SCIENCE, FY 1975

ITEM 4. INSTRUCTIONS

Report funds for facilities which were in process or completed during FY 1975. Expenditures for administration buildings, steam plants, residence halls, and other such facilities should be excluded unless utilized principally for research, development, or instruction in engineering or in the sciences. Land costs should be excluded. Exclude small equipment items in your current fund account costing approximately $200 to $500 or less, as determined by institutional policy.

Facilities and equipment expenditures include the following: (a) fixed equipment such as built-in equipment and furnishings; (b) movable scientific equipment such as oscilloscopes, pulse-height analyzers; (c) movable furnishings such as desks; (d) architect's fees, site work, extension of utilities, and the building costs of service functions such as integral cafeterias and auditoriums of a facility; (e) facilities constructed to house separate components such as medical schools and teaching hospitals; and (f) special separate facilities used to house scientific apparatus such as accelerators, oceanographic vessels, and computers.

Field of science		Thousands of dollars: Total (1)	Federal Government (2)	All other sources (3)
a. Engineering	1710	$ 118,461	$ 64,092	$ 54,369
b. Physical sciences	1720	81,171	19,072	62,099
c. Environmental sciences	1730	35,208	6,880	29,328
d. Mathematical sciences	1740	25,962	5,161	20,801
e. Life sciences	1750	658,534	166,859	491,675
f. Psychology	1760	11,530	2,249	9,281
g. Social sciences	1770	50,008	2,790	47,218
h. Other sciences, NEC	1780	37,557	4,172	33,385
i. Total (sum of a through h)	1700	$ 1,018,431	$ 270,275	$ 748,156

APPENDIX C.

NSF FORM 411 (Oct. 1975)

FORM APPROVED
OMB No. 99-R0279

REPRODUCTION OF SURVEY FORM
NATIONAL SCIENCE FOUNDATION
Washington, D.C. 20550

SURVEY OF SCIENTIFIC AND ENGINEERING EXPENDITURES AT UNIVERSITIES AND COLLEGES, FY 1975
(Current and Capital Expenditures for Research, Development, and Instruction in the Sciences and Engineering)

Organizations are requested to complete and return this form to:

NATIONAL SCIENCE FOUNDATION
1800 G Street, N.W.
Washington, D.C. 20550
Attn: UNISG

This form should be returned by November 30, 1975. Your cooperation in returning the survey questionnaire promptly is very important.

Financial data are requested for your institution's 1975 fiscal year.

All financial data requested on this form should be reported in thousands of dollars; for example, an expenditure of $25,342 should be rounded to the nearest thousand dollars and reported as $25.

Where exact data are not available, estimates are acceptable.

Please correct if name or address has changed

(Aggregate data from 22 university-administered FFRDC's)

Include data for branches and all organizational units of your institution, such as medical schools and agricultural experiment stations. Also include hospitals or clinics owned, operated, or controlled by universities, and integrated operationally with the clinical programs of your medical schools. Exclude data for Federally Funded Research and Development Centers (FFRDC's). A separate questionnaire is included in this package if your institution administers an FFRDC. If you have any questions, please contact Jim Hoehn (202-282-7790).

Please note in space below:
(1) Any suggestions to improve the design of the survey questionnaire; (2) any suggestions to improve the instructions.

(Attach additional sheets, if necessary.)

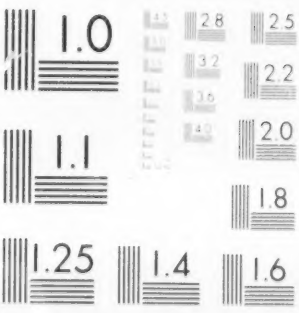
NAME OF PERSON WHO PREPARED THIS SUBMISSION

TELEPHONE: AREA | EXCHANGE | NUMBER | EXTENSION

TITLE

DATE

Please check and correct if necessary the name and address of your institution shown on the mailing label.



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963-A

ITEM 1. CURRENT EXPENDITURES FOR SEPARATELY BUDGETED RESEARCH AND DEVELOPMENT (R&D) IN THE SCIENCES AND ENGINEERING, BY SOURCE OF FUNDS AND TYPE OF ACTIVITY, FY 1975 (Include indirect costs)

ITEM 1. INSTRUCTIONS

Separately budgeted research and development includes all funds expended for activities specifically organized to produce research outcomes and commissioned by an agency either external to the institution or separately budgeted by an organizational unit within the institution. Include expenditures from both the unrestricted and restricted current fund accounts. Exclude training grants, public service grants, demonstration projects, etc.

Include in lines a through f only restricted funds. Restricted funds include those monies which were restricted by the sponsor as to the specific operating purpose for which they could be expended. The determination of restricted or unrestricted (institutional) funds reflects the ability of your institution to change the purpose for which the funds are expended without further authorization from the source of the monies. The restricted funds category of Federal, State, or local governments includes all R&D expenditures from funds received through appropriations, grants, or contracts from these sources and restricted by them as to use. The funding source is determined by the organization (e.g., State government, foundation, etc.) that designates the money for research and development even if your organization determines which projects are to be funded. Include reimbursed indirect costs.

Include in line g any funds your institution was free to designate for R&D. The sources of these funds may include: (a) unrestricted or general purpose State or local government appropriations, (b) general purpose grants from industry, foundations, or other outside sources, (c) tuition and fees, (d) endowment income, (e) unreimbursable indirect costs associated with R&D financed by outside organizations.

Source of funds		(1) Total R&D expenditures	(2) Basic research	(3) Applied research	(4) Development
		(Thousands of dollars)	(Percent of column one)		
a. Federal Government	1110	$ 982,698	31.2 %	35.1 %	33.7 %
b. State government	1120	1,152			
c. Local government	1130	223			
d. Private foundations and voluntary health agencies	1140	655			
e. Industry	1150	243			
f. All other outside sources	1160	2546			
g. Institutional funds	1170	1,219			
h. Total (sum of a through g)	1100	$ 986,736	31.2 %	35.1 %	33.7 %

Basic research is directed toward an increase of knowledge. It is research where the primary aim of the *investigator* is a fuller knowledge or understanding of the subject under study rather than a practical application thereof.

Applied research is directed toward the practical application of knowledge. The definition of applied research differs from basic research chiefly in terms of the objectives of the *investigator*.

Development is the systematic use of knowledge directed toward the design and production of useful prototypes, materials, devices, systems, methods, or processes. It does *not* include quality control or routine product testing.

ITEM 2. (next page) INSTRUCTIONS

Total and federally financed basic research (Columns 3 and 4) by field of science are optional. This information is needed by NSF and others interested in the health of basic research. If you are unable to provide this information for FY 1975, please indicate its feasibility for FY 1976.

Yes _____ No _____

If "no", please explain _____

Enclosed is a departmental data worksheet which may be useful in collecting basic research and departmental research from department chairpersons. NSF will provide as many data worksheets as needed.

ITEM 2. TOTAL AND FEDERALLY FINANCED EXPENDITURES FOR SEPARATELY BUDGETED RESEARCH AND DEVELOPMENT, BY FIELD OF SCIENCE, FY 1975

Field of science	Illustrative disciplines		Thousands of dollars: Total	Thousands of dollars: Federal
a. ENGINEERING	Aeronautical, agricultural, chemical, civil, electrical, industrial, mechanical, metallurgical, mining, nuclear, petroleum, bio-and-biomedical, energy, textile, architecture	1410	$ 278,116	$ 277,686
b. PHYSICAL SCIENCES (TOTAL)		1420	533,101	531,023
(1) Astronomy	Astrophysics, optical and radio, x-ray, gamma-ray, neutrino	1421	31,153	31,153
(2) Chemistry	Inorganic, organo-metallic, organic, physical, analytical, pharmaceutical, polymer science (exclude biochemistry)	1422	84,862	84,392
(3) Physics	Acoustics, atomic and molecular, condensed matter, elementary particles, nuclear structure, optics, plasma	1423	406,086	404,499
(4) Other	Used for multidisciplinary projects within physical sciences and for disciplines not requested separately	1424	11,000	10,979
c. ENVIRONMENTAL SCIENCES	ATMOSPHERIC SCIENCES: Aeronomy, solar weather modification, meteorology, extra-terrestrial atmospheres GEOLOGICAL SCIENCES: Engineering geophysics, geology, geodesy, geomagnetism, hydrology, geochemistry, paleomagnetism, paleontology, physical geography, cartography, seismology, soil sciences OCEANOGRAPHY: Chemical, geological, physical, marine geophysics, marine biology, biological oceanography	1430	56,958	56,011
d. MATHEMATICAL SCIENCES (TOTAL)		1440	61,595	61,447
(1) Mathematics	Algebra, analysis, applied mathematics, foundations and logic, geometry, numerical analysis, statistics, topology	1441	17,659	17,570
(2) Computer sciences	Design, development, and application of computer capabilities to data storage and manipulation, information science	1442	43,936	43,877
e. LIFE SCIENCES (TOTAL)		1450	43,531	43,110
(1) Biological sciences	Anatomy, biochemistry, biophysics, biogeography, ecology, embryology, entomology, genetics, immunology, microbiology, nutrition, parasitology, pathology, pharmacology, physical anthropology, physiology, botony, zoology	1451	32,908	32,720
(2) Agricultural	Agricultural chemistry, agronomy, animal science, conservation, dairy science, plant science, range science, wildlife	1452	0	0
(3) Medical	Anesthesiology, cardiology, endocrinology, gastroenterology, hematology, neurology, obstetrics, ophthamology, preventive medicine and community health, psychiatry, radiology, surgery, veterinary medicine, dentistry, pharmacy	1453	4,963	4,885
(4) Other	Used for multidisciplinary projects within life sciences	1454	5,660	5,505
f. PSYCHOLOGY	Animal behavior, clinical, educational, experimental, human development and personality, social	1460	306	304
g. SOCIAL SCIENCES (TOTAL)		1470	795	795
(1) Economics	Econometrics, international, industrial, labor, agricultural, public finance and fiscal policy	1471	795	795
(2) Political science	Regional studies, comparative government, international relations, legal systems, political theory, public administration	1472	0	0
(3) Sociology	Comparative and historical, complex organizations, culture and social structure, demography, group interactions, social problems and welfare, theory	1473	0	0
(4) Other	History of science, cultural anthropology, linguistics, socio-economic geography, research in education	1474	0	0
h. OTHER SCIENCES	To be used when the multidisciplinary and interdisciplinary aspects make the classification under one primary field impossible, do *not* include nonscience activities such as English or music in this survey	1480	12,334	12,322
i. TOTAL (SUM of a through h) Check to insure that column totals are identical with data reported in item 1.		1400	986,736	982,698

NSF Form 411 (Oct. 1976)

NATIONAL SCIENCE FOUNDATION

SURVEY OF SCIENTIFIC AND ENGINEERING EXPENDITURES AT UNIVERSITIES AND COLLEGES, FY 1976

OPTIONAL DEPARTMENTAL DATA SHEET

FORM APPROVED
OMB No. 99-R0279

Science or Engineering Department (or unit) covered by this data sheet: _____

Person in Department (or unit) preparing this form: Name _____ Tel.: ( ) _____ EXT. ____

TOTAL SEPARATELY BUDGETED RESEARCH AND DEVELOPMENT, FY 1976
(Include indirect costs)

TOTAL SEPARATELY BUDGETED RESEARCH AND DEVELOPMENT	=	ESTIMATED BASIC RESEARCH	+	ESTIMATED APPLIED RESEARCH & DEVELOPMENT
100%	=	%	+	%

Separately budgeted research and development includes all funds expended for activities specifically organized to produce research outcomes and commissioned by an agency either external to the institution or separately budgeted by an organizational unit within the institution. Include expenditures from both the unrestricted and restricted current fund accounts. Exclude training grants, public service grants, demonstration projects, etc.

Basic Research is research where the primary aim of the investigator is a fuller knowledge or understanding of the subject under study rather than a practical application thereof.

Applied Research is directed toward the practical application of knowledge. The definition of applied research differs from basic research chiefly in terms of the objectives of the investigator. Development is the systematic use of knowledge directed toward the design and production of useful prototypes, materials, devices, systems, methods, or processes.

FEDERALLY FINANCED R&D EXPENDITURES	=		+	
100%	=	%	+	%

CURRENT EXPENDITURES FOR INSTRUCTION AND DEPARTMENTAL RESEARCH, FY 1976
(Direct costs only)

TOTAL INSTRUCTION AND DEPARTMENTAL RESEARCH	=	ESTIMATED DEPARTMENTAL RESEARCH EXPENDITURES
100%	=	%

Include the salaries of department heads; faculty members, secretaries and technicians; office and laboratory supplies; and expenditures for degree credit instructional programs in science and engineering subjects. The time spent in supervising the thesis work of graduate students should be reported as an expenditure for instruction, not for departmental research.

Departmental Research (non-sponsored research) is "personal" or "faculty" research supported by General Funds of the department as a specifically assigned, departmentally planned, or mutually understood part of the faculty member's total activity.

100

☆U.S. GOVERNMENT PRINTING OFFICE: 1977—241-314-8

ITEM 3. CURRENT EXPENDITURES FOR INSTRUCTION AND DEPARTMENTAL RESEARCH IN GRADUATE DEGREE GRANTING INSTITUTIONS IN THE SCIENCES AND ENGINEERING, BY FIELD OF SCIENCE, FY 1975 (Direct expenditures only)

OMIT ITEM 3 IF YOUR INSTITUTION DOES NOT GRANT A DOCTORATE OR MASTER'S DEGREE IN THE SCIENCES OR ENGINEERING

ITEM 3. INSTRUCTIONS

Include the salaries of department heads, faculty members, secretaries and technicians; office and laboratory supplies; and expenditures for degree credit instructional programs in science and engineering subjects. The time spent in supervising the thesis work of graduate students should be reported as an expenditure for instruction, not for departmental research. Departmental research (nonsponsored research) is "personal" or "faculty" research supported by General Funds of the department as a specifically assigned, departmentally planned, or mutually understood part of the faculty member's total activity.

Field of science		Total instruction and departmental research (Thousands of dollars) (1)	Departmental research as a percent of col. 1 (No decimals) (2)
a. Engineering	1510	$	%
b. Physical sciences	1520		%
c. Environmental sciences	1530		%
d. Mathematical sciences	1540		%
e. Life sciences	1550		%
f. Psychology	1560		%
g. Social sciences	1570		%
h. Other sciences, NEC	1580		%
i. Total (sum of a through h)	1500	$	

ITEM 4. CAPITAL EXPENDITURES FOR SCIENTIFIC AND ENGINEERING FACILITIES AND EQUIPMENT FOR RESEARCH, DEVELOPMENT, AND INSTRUCTION, BY FIELD OF SCIENCE, FY 1975

ITEM 4. INSTRUCTIONS

Report funds for facilities which were in process or completed during FY 1975. Expenditures for administration buildings, steam plants, residence halls, and other such facilities should be excluded unless utilized principally for research, development, or instruction in engineering or in the sciences. Land costs should be excluded. Exclude small equipment items in your current fund account costing approximately $200 to $500 or less, as determined by institutional policy.

Facilities and equipment expenditures include the following: (a) fixed equipment such as built-in equipment and furnishings; (b) movable scientific equipment such as oscilloscopes, pulse-height analyzers; (c) movable furnishings such as desks; (d) architect's fees, site work, extension of utilities, and the building costs of service functions such as integral cafeterias and bookstores of a facility; (e) facilities constructed to house separate components such as medical schools and teaching hospitals; and (f) special separate facilities used to house scientific apparatus such as accelerators, oceanographic vessels, and computers.

Field of science		Thousands of dollars		
		Total (1)	Federal Government (2)	All other sources (3)
a. Engineering	1710	$ 36,844	$ 36,844	$ 0
b. Physical sciences	1720	93,241	93,241	0
c. Environmental sciences	1730	5,552	5,552	0
d. Mathematical sciences	1740	6,777	6,777	0
e. Life sciences	1750	5,175	5,175	0
f. Psychology	1760	0	0	0
g. Social sciences	1770	0	0	0
h. Other sciences, NEC	1780	396	396	0
i. Total (sum of a through h)	1700	$ 147,985	$ 147,985	$ 0

99

Other Science Resources Publications

REPORTS	NSF No.	Price
Women and Minorities in Science and Engineering	77-304	$0.75
Characteristics of the National Sample of Scientists and Engineers, 1974		
Part 1. Demographic and Educational	75-333	$1.90
Part 2. Employment	76-323	$2.80
Part 3. Geographic	76-330	$2.00
U.S. Scientists and Engineers, 1974	76-329	$1.25
An Analysis of Federal R&D Funding by Function, Fiscal Years 1969-1977	76-325	$2.45
Research and Development in Industry, 1974. Funds, 1974; Scientists & Engineers, January 1975	76-322	$2.00
Projections of Degrees and Enrollment in Science and Engineering Fields to 1985	76-301	$1.15
The 1972 Scientist and Engineer Population Redefined		
Volume 1. Demographic, Educational, and Professional Characteristics	75-313	$3.70
Volume 2. Labor Force and Employment Characteristics	75-327	$2.65
Detailed Statistical Tables, Engineers, By Field	76-306	—
Characteristics of Doctoral Scientists and Engineers in the United States, 1973	75-312	$1.15
Detailed Statistical Tables	75-312-A	—
R&D Activities of Independent Nonprofit Institutions, 1973	75-308	$1.90
Research and Development in State Government Agencies, Fiscal Years 1972 and 1973	75-303	$1.80

Young and Senior Science and Engineering Faculty, 1974: Support, Research Participation, and Tenure	75-302	$1.70
Projections of Science and Engineering Doctorate Supply and Utilization, 1980 and 1985	75-301	$1.30

REVIEWS OF DATA ON SCIENCE RESOURCES		
No. 28. "Scientists and Engineers From Abroad.: Trends of the Past Decade, 1966-75"	77-305	$0.35
No. 27. "Education and Work Activities of Federal Scientific and Technical Personnel, January 1974"	76-308	$0.40
No. 26. "Energy and Energy-Related R&D Activities of Federal Installations and Federally Funded Research and Development Centers. Funds, FY 1973-75 (est.) and Manpower, Jan. 1973-75 (est.)"	76-304	$0.35
No. 25. "Doctoral Scientists and Engineers in Private Industry, 1973"	76-302	$0.35

HIGHLIGHTS		
"Largest Increase in Employment of Doctoral Scientists and Engineers is in Industrial Sector, 1973-75"	76-326	—
"Energy Increase of 18 Percent Paces Industrial R&D Spending in 1975"	76-324	—